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The Chemical Society has been gratified by the eagerness with which many young men of learning have taken seats among the audience. It has especially marked the sympathetic encouragement given to its labors by the presence of Messrs. Balard, Claude Bernard, Delafosse, Frémy, Serret, members of the Academy of Sciences.

May I be permitted, moreover, to especially thank, in my name and in the name of the Society, our illustrious President, M. Dumas, whose lofty and benevolent patronage has always served science almost as much as his immortal works.

L. PASTEUR.

Paris, 1860.

#### FIRST LECTURE.

At the close of the year 1808, Malus announced that light reflected from all bodies, whether opaque or diaphanous, acquired very extraordinary new properties, which essentially distinguished it from light transmitted directly from luminous bodies.

The modification which light undergoes in the act of reflection Malus denominated *polarization*. Later, this was designated under the name of *plane of polarization* of the ray, the plane of reflexion itself, that is to say, the plane passing by the incident ray and the normal to the reflecting surface.

Malus did not limit his discoveries on polarized light to this. It had long been known that a ray of direct light always separated into two white fasciculi, of the same intensity, in its passage through a rhomboid of carbonate of lime. The flame of a candle, observed by the aid of such rhomboid, is always double, and the two images have the same brightness.

Huygens and Newton had observed that light, which has passed through a crystal of Iceland spar, no longer comports itself like direct light. So, looking through a new rhomboid at one or the other of the two images of the candle we have just mentioned : 1. There will not always be bifurcation of the ray: 2. When there is bifurcation, the two new images will not have the same intensity. Light, which has traversed a bi-refrangent crystal, is different, then, from natural or direct light. This admitted, Malus proved that the modification impressed upon light by double refraction was identical with that which reflexion produces from the surface of opaque or diaphanous



bodies; in other words, that the two rays, ordinary and extraordinary, given by a bi-refrangent crystal, are polarized rays.

Malus established so clearly from the beginning, these fruitful discoveries, with so much care and so much precision in his facts and in his language, that one might believe, in reading his memoirs, that they were prepared yesterday. But he could not pursue his work: premature death carried him off in 1812, at the age of thirty-seven years. Happily for science, two celebrated physicists, at that time young and full of activity, MM. Biot and Arago, received his legacy, and were not slow to distinguish themselves by brilliant discoveries in the new route which Malus had just opened to science.

In 1811, Arago observed, that when a polarized ray traversed normally a plate of rock crystal cut perpendicularly to its axis, the ray, on issuing from the plate, if analyzed by aid of a rhomboid of Iceland spar, gives *constantly two images* in every position of the rhomboid; and further, these two images are colored with the complementary tints. When the thickness of the spar does not permit an entire separation of the two fasciculi, the image is white where they are in part superposed.

This experiment presents a double anomaly to the ordinary laws of bi-refrangent crystals. Every other crystal, with an axis cut normally to this axis, would have furnished two white images, in place of being colored, and, in two rectangular positions of the rhomboid analyzer, the images would be reduced to a single one.

The conclusion of Arago was, that the results of the preceding experiment are precisely those which should follow, if we suppose that the differently colored rays of the incident white fasciculus are, on issuing from the plate of the quartz, polarized in different planes.

Arago does not recur to these brilliant phenomena, the laws of which M. Biot presented since 1813, carefully isolating them from those among which Arago appeared to confound them.

M. Biot formed the polarized ray successively with each of the simple rays of the spectrum, and found that the plane of primitive polarization was deviated at an angle proportional to the thickness of the plate; that this angle is different for each

simple color, and goes on increasing with the refrangibility, according to a determined law. M. Biot also made the very curious observation that, of the plates obtained from different pieces of quartz, there were some which deviated the planes of polarization to the right and some to the left, following the same laws.

But the most remarkable discovery of M. Biot, in this kind of phenomena, is, without contradiction, that of the deviation imparted to planes of polarization by a great number of natural organic products, essence of turpentine, solutions of sugar, of camphor, of tartaric acid, &c. The first announcement of this fact is found in the bulletin of the Philomathic Society for December, 1815.

For the understanding of this lecture, we should especially notice the existence of the rotary property in tartaric acid, and its absence in paratartaric or racemic acid, an acid which is isomeric with tartaric acid.

There exists then liquid organic products or solutions in water which possess the rotary property, and in this respect remind us of the solid, crystallized quartz. But it is essential to note here that this analogy to quartz is entirely apparent. There was in both cases deviation of the plane of polarization, but the characters of the phenomenon were very different.

Quartz deviates, but it must be crystallized. Dissolved or solid, and not crystallized, it has no action. Not only must it be crystallized, but it must be cut in plates perpendicular to the axis. From the moment the plate is a little inclined in the direction of the ray, the action abates and then ceases.

Sugar deviates, (and what I say of sugar is true of all other organic products), but the sugar must be either dissolved, or solid and amorphous like barley sugar. In the crystallized state it is impossible to discover any action.

The tube containing the solution of sugar may be inclined. The deviation does not change for the same thickness. Further, by violently agitating the liquid by the assistance of a clock-work movement, the phenomenon remains the same.

Thus M. Biot concluded from the beginning, strictly that the action exerted by organic bodies was a molecular action, peculiar to their ultimate particles, dependent upon their individual

constitution. In quartz the phenomenon results from the mode of aggregation of the crystalline particles.

These are the physical precedents, if I may so express myself, of the researches with which I propose to entertain you. Here are their mineralogical precedents.

## II.

Hemihedrité\* is assuredly, among the peculiarities of crystallization, the one which is the easiest to seize in its external manifestation : consider, for example, a species of mineral crystallizing in the cubic form. This form, as all know, may surround different kinds of determinate forms by the law of symmetry, a law so natural that it is, so to speak, a physical axiom. The expression of this law is, that a form being given, all others compatible with it may be obtained by a contrivance which would consist in modifying, truncating, as Romé de Lisle said, at the same time and in the same manner the identical parts. The identical edges are those which are at the intersection of faces respectively identical, mutually cutting at the same angle ; and solid identical angles, those which are formed by dihedral angles respectively equal and similarly placed. For example, in the cube there is but one kind of solid angles and one kind of edges. Let one of the solid angles be truncated by a face equally inclined to the three faces of the solid angle, and the seven other angles should be, at the same time, by a face of the same nature. This is observed in alum, in galena, and generally in all cubic species.

Let us consider a right prism with a rhomb base. The eight edges of the bases are identical. If one is truncated, the seven others should be, and in the same manner. The four vertical edges are of another kind. Generally they will not be truncated at the same time as those of the bases, and if they are, it will be differently.

These examples alone will suffice to explain the law of symmetry and its application.

Nothing is more simple than to have a clear idea of hemihedrité. Experiment has long since shown, Haüy was acquainted with the most celebrated instances, that, in a crystal,

\* *Emisus*, half ; *edron* side.

the half only of the identical parts are sometimes modified at the same time and in the same manner. It is said in such case that there is hemihedrity. Thus, the cube ought to be truncated at the same time on its eight solid angles. But, in certain cases it is so only on four. Boracite affords an instance of this kind. Under these circumstances the modification occurs in such wise that in prolonging the four truncations in a way to make the faces of the cube disappear, we obtain a regular tetrahedron. If the modification were applied to the four remaining angles it would produce another regular tetrahedron, identical with and superposable on the first, and differing from it only by its position on the cube.

In the same way let us take our right prism truncated on the eight edges of its bases. In certain species the truncation occurs upon half of the edges only, and it also happens here that the truncations, bearing upon edges opposite at each base and crossing at the two extremities, when prolonged, lead to a tetrahedron. There are two tetrahedrons possible, as for the cube, differently placed in relation to the prism, accordingly as it preserves such or such group of four truncations; but here the two tetrahedrons are not absolutely identical. These are symmetrical tetrahedrons. We cannot superpose them.

These notions suffice to show what is meant by hemihedrity, and what is understood by hemihedric faces or forms.

Now, quartz of which we just spoke, is one of the rare mineral substances in which Häüy found hemihedric faces. The habitual form of this mineral, a regular hexagonal prism, terminated by two pyramids of six faces, is well known. It is clear that the trihedral angles situated at the base of the faces of the pyramid are identical, and, consequently, if one of them bears a face, it ought to be reproduced on all the others. This is true of the face termed *rhombiferous* by mineralogists.

But Häüy first remarked, in certain specimens, a face very different from this, which he designated by the letter *x*, which falls more on one side than on the other, without being double, as the law of symmetry would in this case require. Another very curious peculiarity of these crystals has not escaped crystallographers. It is that the face *x* is inclined sometimes in one direction and sometimes in another. Häüy, who was fond

of bestowing epithets appropriate to each variety of a species, applied the term *plagihedral* to the variety of quartz having the face  $x$ . Crystals in which the face  $x$  inclined to the right, are designated under the name right plagihedrals, the crystal being adjusted in a suitable manner; and those crystals in which the face  $x$  inclined in an opposite direction are termed left plagihedrals.

Nothing is more variable than this character. Here it exists; there it is absent. Upon the same crystal there are angles which bear the face  $x$ ; others which should have it, have it not. Sometimes we find plagihedral faces to the right and to the left. Nevertheless, all persons versed in a knowledge of crystals, admit that there is in quartz a true hemihedricity in two opposite directions.

Here is placed a very ingenious approximation due to Sir John Herschell, communicated to the Royal Society of London, in 1820.

M. Biot, as I previously said, made the remarkable observation, that among the specimens of quartz, some deviated in the direction of the plane of polarized light, and others in an opposite direction, to the right and to the left. This stated, John Herschell associated the crystallographic observation of Haüy with the physical remark due to M. Biot. Experiment confirmed the idea of a relation, in fact, between the right and left plagihedrals and the right and left optical deviations. Specimens of quartz which bear in one direction the face  $x$ , deviate the plane of polarized light in the same direction.

Such is an exposition of the principal facts which have preceded the researches, an abridged history of which I have to relate.

### III.

When I began to devote myself to particular pursuits I sought to fortify myself in the study of crystals, anticipating that I would derive assistance from it in my chemical researches. The most simple means, it seemed to me, was to take a somewhat extensive work upon crystalline forms, to repeat all the measurements and to compare my determinations with those of the author. In 1841, M. de la Provostaye, whose exactness is well

known, published a handsome work on the crystalline forms of tartaric acid, paratartaric acid, and their saline combinations. I took hold of this memoir. I crystallized tartaric acid and its salts, and I studied the forms of their crystals. But, in my progress, I perceived that a very interesting fact had escaped the learned physicist. All the tartrates I studied afforded decided indications of hemihedric faces.

This particularity of form in the tartrates was not very evident. This may be readily conceived, since it had not yet been observed. But when, in one species, it appeared in doubtful characters, I always succeeded in rendering it more manifest, by recommencing the crystallization and slightly modifying the conditions. Sometimes the crystals bore all the faces required by the law of symmetry, but hemihedrity had credit for an unequal development of one half the faces. This was seen for example in the ordinary tartar emetic. It may be said that what adds to the difficulty in recognising hemihedrity, are the frequent irregularities of crystals which are never easily developed. Hence their results, deformities, arrests of development in this or that direction, faces accidentally suppressed, &c. Except under circumstances almost exceptional, the ascertaining of hemihedrity, especially in crystals of the laboratory, requires a very attentive study. Besides that, although hemihedrity may be possible in a form, although it may be a function of the internal structure of the body, it may not be externally manifest, any more than is found upon every crystal of the cubic species all the forms compatible with the cube.

But be that as it may, I repeat, I found hemihedric tartrates.

This observation would have been barren, probably, without the following :—

Let  $a, b, c$ , be the parameters of the crystalline form of any tartrate;  $\alpha, \beta, \gamma$ , be the angles of the crystallographic axes. These are ordinarily right angles or a little oblique. Besides, the relation of the two parameters, such as  $a$  and  $b$ , is nearly the same in the different tartrates, whatever may be their composition, the quantity of their water of crystallization, the nature of their bases;  $\gamma$ , alone differs sensibly. There is a kind of semi-isomorphism among all the tartrates. One might say that the tartaric group prevails and impresses a stamp of resem-



blance between these different forms, in spite of the difference of the other constituent elements.

It follows from this that there is something in common in the forms of all the tartrates, and it is possible to arrange them similarly, in taking for example, as character of similar position, the position of the axes  $\alpha$  and  $\beta$ .

Now, if the disposition of the hemihedric faces be compared on all the prisms of the primitive forms of the tartrates, arranged in the same manner, this disposition is found to be the same.

Let us sum up in two words these results, which have been the point of departure in all my ulterior researches: the tartrates are hemihedric, and they are so in the same direction.

Guided on the one hand by the fact of the existence of molecular rotary polarization, discovered by M. Biot in tartaric acid and in all its combinations; on the other, by the ingenious approximation of Herschell; in the third place, by the learned views of M. Delafosse, with whom hemihedrity has always been a law of structure and not an accident of crystallization, I presumed there might be a correlation between the hemihedrity of the tartrates and their property of deviating the plane of polarized light.

It is important to seize here the sequence of ideas:

Haüy and Weiss ascertained that in quartz there exists hemihedric faces, and that these faces fall to the right in certain specimens, and to the left in others. On his side, M. Biot found that crystals of quartz are also divided into two groups, under the relation of their optical properties, some deviating to the right, and the others deviating to the left, the plane of polarized light according to the same laws. Herschell comes in his turn, places between these two facts, until then isolated, a line of connexion, and says: The plagihedrals of one direction deviate in the same direction; the plagihedrals of the other direction deviate in the opposite direction.

For my part I find that all the tartrates are plagihedral, if I may so express myself, and that they are all in the same direction. I should then presume that here, as in quartz, there was a correlation between hemihedrity and circular polarization. At all events, the essential differences which I have just noticed

between the circular polarization of quartz and that of tartaric acid, ought not to be neglected.

We are now, thanks to the new facts which precede, and to the approximations which I have just enumerated, in possession of a preconceived idea, (for it is as yet nothing more,) on the possible correlation of hemihedricity and the rotary power of the tartrates.

Very desirous to find in experiment a corroboration of this still speculative proof, my first thought was to ascertain whether the very numerous crystallizable organic products, which possess the molecular rotary property, have hemihedric crystalline forms, which no one suspected, notwithstanding the approximation of Herschell. This investigation had the success which I anticipated for it.

I occupied myself also with the examination of the crystalline forms of paratartaric acid and its salts, substances isomeric with tartaric combinations, but all of which M. Biot found inoperative upon polarized light. None was found hemihedric.

The idea of the correlation of hemihedricity, and the molecular rotary power of natural organic products, gained ground.

I was soon led to develop it clearly by a very unexpected discovery.

#### IV.

It is necessary to submit here a very remarkable note from M. Mitscherlich, which was communicated to the Academy of Sciences by M. Biot. Here it is:—

“The paratartrate and tartrate (double) of soda and ammonia have the same chemical composition, the same crystalline form with the same angles, the same specific weight, the same double refraction, and consequently the same angle of optical axes. Dissolved in water their refraction is the same. But the dissolved tartrate turns the plane of polarized light and the paratartrate is indifferent, as M. Biot found through the series of these two genera of salts. But, adds M. Mitscherlich, *here the nature and the number of atoms, their arrangement and their distances, are the same in the two compared bodies.*”

This note of M. Mitscherlich deeply interested me at the

time of its publication. I was then a pupil at the Normal School, leisurely meditating on the beautiful studies of the molecular constitution of bodies, and attained, as I thought at least, to a clear comprehension of the principles generally admitted by physicians and chemists. The preceding note disturbed all my ideas. What precision in all the details! Are there two bodies whose properties have been better studied, better compared? But in the actual state of science can we conceive two substances so similar without being identical? M. Mitscherlich himself tells us what was, in his mind, the consequence of this similitude:

*The nature, the number, the arrangement, and the distance of atoms are the same. If this is true, what then becomes of this definition of chemical species, so rigorous, so remarkable for the time in which it appeared, given in 1823, by M. Chevreul? In compound bodies, species is a collection of beings identical in the nature, the proportion and the arrangement of their elements.*

In short, the note of M. Mitscherlich rested in my mind as an obstacle of the first order to our manner of considering material bodies.

Every body will understand now, that, being prepossessed, for reasons stated, with a notion of a possible correlation between hemihedricity of the tartrates and their rotary property, the note of M. Mitscherlich, of 1844, would recur to my memory. M. Mitscherlich, I at once supposed, was deceived upon one point. He could not have seen that his double tartrate was hemihedric, that his paratartrate was not, and if these things are so, the results of his note are not extraordinary; and I would have in it besides the best criterion of my preconceived idea about the correlation of hemihedricity and the rotary phenomenon.

I then hastened to resume the study of the crystalline form of the two salts of M. Mitscherlich. I found, in fact, that the tartrates were hemihedric like all the tartrates which I had previously studied, but, strangely enough, the paratartrate was also hemihedric. Only the hemihedric faces which, in the tartrate, had all the same direction, were inclined in the paratartrate sometimes to the right, sometimes to the left. In spite of all that was unexpected in this result, I did not the less pursue

my idea. I carefully separated the crystals hemihedric to the right, and the crystals hemihedric to the left, and observed their solutions separately in a polarizing apparatus. I then saw with no less surprise than pleasure, that the crystals hemihedric to the right deviated the plane of polarization to the right; the crystals hemihedric to the left deviated to the left, and when I took an equal weight of the two kinds of crystals, the mixed solution was neutral to light by the neutralization of the two equal and opposite individual deviations.

Thus I set out from the paratartaric acid; I obtained in the ordinary way the double paratartrate of soda and ammonia, and after some days the solution deposits crystals, all of which have exactly the same angles, the same aspect to such a degree, that M. Mitscherlich, the celebrated crystallographer, in spite of the most minute and severe study, could not detect any difference between them. The molecular arrangement in the two, however, is entirely different. The rotatory power as well as the mode of dissymmetry attest it. The two species of crystals are isomorphous, and isomorphous with the corresponding tartrate; but here the isomorphism is presented with a peculiarity without example up to this time; it is the isomorphism of two dissymmetric crystals which reflect themselves in a mirror. This comparison presents the fact in a very just manner. In fact, if in both species of crystals I suppose the hemihedric facettes prolonged until they mutually meet, I obtained two symmetrical tetrahedrons inverse, and which cannot be superposed in spite of the perfect identity of all their respective parts. Hence I must conclude that I had separated by the crystallization of the double paratartrate of soda and ammonia, two atomic groups symmetrically isomorphous, intimately united in paratartaric acid. Nothing is easier than to prove that these two species of crystals represent two distinct salts, from which may be derived two different acids.

It is sufficient to proceed, as in all similar cases, to precipitate each salt by a salt of lead or barytes, and then to isolate the acids by sulphuric acid.

The study of these acids possesses immense interest; I know none more interesting.

But before submitting it, permit me to present here some notes relative to their discovery.

## V.

The announcement of the preceding facts naturally placed me in relation with M. Biot, who was not without doubts about their exactness. Charged with reporting upon it to the Academy, he caused me to go to his place to repeat the decisive experiment under his eyes. He sent to me the paratartaric acid which he had previously studied with particular care, and found to be perfectly neutral to polarized light. I prepared in his presence the double salt of soda and ammonia, which he also desired me to procure. The liquor was left in one of his closets to slowly evaporate, and when it had furnished about 30 or 40 grammes of crystals, he requested me to go to the college of France for the purpose of collecting and isolating, under his eye by examining their crystallographic characters, the right and left crystals, desiring me to declare anew, if I affirmed that the crystals which I should place to his right would deviate to the right and the others to the left. That done, he said he would take charge of the rest. He prepared the solutions in strong proportions, and at the moment of observing them in the polarizing apparatus he again invited me into his cabinet. He first placed in the apparatus the most interesting solution, that which ought to deviate to the left. Even without any measuring, he saw, from the aspect alone of the tints of the two images, ordinary and extraordinary, of the analyser, that there was a strong deviation to the left. Then, with very visible emotion the illustrious sage took my arm and said :—" My dear child, I have loved science so much all my life that this makes my heart beat."

You will excuse, gentlemen, these personal recollections, which will never be effaced from my mind. In our times, with our habits, they should be excluded from a scientific memoir, but they seem to me proper in an oral exposition; and perhaps the biographic interest of similar recollections will constitute one of the advantages of the kind of teaching which the Chemical Society now inaugurates.

Besides, there is more here than personal recollections. The emotion of the sage in M. Biot was mingled with the internal pleasure of beholding his own anticipations realized. For more than thirty years M. Biot had vainly endeavored to induce chemists to participate in his conviction, that the study of rotary

polarization afforded one of the surest means of obtaining knowledge of the molecular constitution of bodies.

## VI.

Let us return to the two acids which furnish the two kinds of crystals so unexpectedly deposited by the crystallization of the double paratartrate of soda and ammonia. Nothing, I repeat, is more interesting than the study of these acids.

In fact, one of the two, that which is derived from crystals of the double salt hemihedric to the right, deviates to the right, and is identical with the ordinary tartaric acid. The other deviates to the left like the salt which furnishes it. The deviation impressed by these two acids upon the planes of polarization is rigorously the same in absolute value. The right acid follows in its deviation particular laws which no active body had yet presented. The left acid offers them in the most faithful manner in inverse sense, without a suspicion of the smallest difference.

And the proof that paratartaric acid is the combination, equivalent to equivalent of these two acids, is, that if we mix, as I am about to do before your eyes, solutions somewhat concentrated of equal weights of each of them, their combination is accompanied by a disengagement of caloric, and the liquid solidifies at once by an abundant crystallization of paratartaric acid, identical with the natural paratartaric acid.\*

Relatively to their chemical and crystallographic properties, whatever may be done with one of these acids, can be repeated with the other under the same conditions, and in all cases we obtain identical products, but not superposable, products which are as like as is the right hand to the left. The same forms, the same faces, the same angles, hemihedric in both cases. The only dissimilarity is in the right or left inclination of the hemihedric facettes, and in the direction of the rotary power.

## VII.

It is manifest, from all these results, that we have to deal with two isomeric bodies, whose general relations of similitude and molecular dissimilitude are known.

\*This beautiful experiment called forth applause from the audience.



Bear in mind the definition of chemical species just now mentioned, namely, the collection of all individuals identical by the nature, the proportion and arrangement of elements. All the properties of bodies are the functions of these three terms, and the object of all our efforts consists in recurring by experiment on properties to the knowledge of these three things.

In isomeric bodies, the nature and proportion [of constituents] are the same. The arrangement alone differs. The great interest of isomerism has been to introduce into science this principle—that bodies may be and are essentially different by that alone, that the arrangement of atoms is not the same in their chemical molecules.

But no isomeric bodies existed whose relations of molecular arrangements were known. This gap is filled for the first time by the discovery of the constitution of paratartaric acid and the relations of constitution of the right and left tartaric acids. We know, in fact, on the one hand, that the molecular arrangements of the tartaric acids are dissymmetric, and on the other, that they are rigorously the same, with the sole difference of presenting dissymmetries in opposite directions. Are the atoms of the right acid grouped according to the spire of a dextrorse helix, or placed at the summits of an irregular tetrahedron, or disposed according to such or such determined dissymmetric assemblage? We are unable to reply to these questions. But what cannot be doubted is, that there is a grouping of atoms according to an order dissymmetric to a non-superposable image. What is not less certain is, that the atoms of the left acid precisely realize the inverse dissymmetric grouping of this one. We also know, that paratartaric acid results from the juxtaposition of these two groupings of inversely dissymmetric atoms.

From this moment the ascertaining the resemblances and the chemical and physical differences which correspond to these arrangements whose relations are known, affords particular interest, and gives to the molecular mechanism assured bases. It permits us to establish the connexion of physical and chemical properties with the molecular arrangement which determines their proper existence, or inversely it permits us to recur from properties to their first cause.

These general relations of properties and corresponding atomic arrangements may be summarily stated as follows:—

1st. When the elementary atoms of organic products are dissymmetrically grouped, the crystalline form of the body manifests this molecular dissymmetry by non-superposable hemihedrity.

The cause of hemihedrity is then recognized.

2d. The existence of this same molecular dissymmetry is translated beyond by the rotary optical property.

The cause of rotary polarization is also determined.\*

3d. When non-superposable molecular dissymmetry is found realized in opposite directions, as happens in the two, right and left, tartaric acids and all their derivatives, the chemical properties of these identical and inverse bodies are rigorously the same; whence it follows that this mode of opposition and of similitude does not alter the ordinary play of chemical affinities.

I am mistaken: upon this latter point there is a restriction to be placed, an important restriction, eminently instructive. Time would fail me to-day to develop it at leisure and properly. It will find a place in the next lecture.

Fresnel, by one of those views of genius of which he has had so many has in a manner presented this cause of rotary polarization.

He expresses himself thus, in one of his memoirs, in volume xxviii. of the "*Annales de Chimie et de Physique*," year 1825:—"Rock crystal presents optical phenomena, which cannot be reconciled with the complete parallelism of the molecular lines, and which would seem to indicate a progressive and regular deviation from these lines in the passage, from one slice of the medium to the next."

(To be continued.)

## ON TINCTURA FERRI CHLORIDI.

Read at the Pharmaceutical Meeting of the Philadelphia College of Pharmacy, held Dec. 3d, 1861.

By W. H. PILE, M. D., Philadelphia.

Every practical druggist must be aware of the uncertainty and perplexity attending the preparing of muriated tincture of iron, the more annoying as this arises not from any want of skill on his part. In fact, it is almost impossible to predict the result of his labors, and the conscientious druggist has often the mortification of finding his best endeavors unavailing in obtaining a satisfactory preparation, and his time and materials together thrown away. Numerous methods have been suggested and devised to overcome these difficulties, as may be seen by glancing back over the various Pharmaceutical Journals of our own and foreign countries, some of these no doubt would yield good results, yet in general they are not practical enough for our Pharmacutists, requiring apparatus which the generality of druggists would rather dispense with.

The object of this paper is to suggest a *modus operandi*, by which a uniform preparation may be secured, independent of those variations of materials, which are unfortunately so often met with.

These variations are with respect to the muriatic acid, it being either too strong, or which is more usually the case, deficient in that particular.

As regards the precipitated carbonate of iron a greater difficulty exists, even when pure; that is, when containing no adulteration. The solubility in acid, of different samples, is exceedingly various, some specimens being almost entirely insoluble, while in the greater number, the digestion and heating calls for the greatest exercise of patience.

This difference of solubility appears to arise from some peculiar state of aggregation, and likewise, according to Gmelin, from its state of hydration or combination with water.

These varying conditions are no doubt caused by precipitating, washing and drying at different temperatures, or a too prolonged exposure to the air.

I have never yet met with a sample, however pure, that would

meet the test of ignition, by which 98 grs. of pure hydrated sesquioxide of iron should lose 18 grs. ; and provided it contained protocarbonate of iron, the loss would be so much the greater, as every 58 grs. of this latter substance would determine a loss of 18 grs. additional.

Perhaps it would be well, in order to a better understanding of the whole subject, to look at the officinal formula of our Pharmacopœia, and by means of the necessary tables calculate the relative quantities of acid and iron in the solution.

The formula is as follows :

Take of Subcarb. Iron, half a pound.

Muriatic Acid, (sp. gr. 1.16) one pint.

With directions to digest with heat until dissolved.

Now a pint of water weighs 7291 grs. ; a pint of acid will therefore weigh  $(7291 \times 1.16)$  8457 grs. According to Ure's tables, muriatic acid, sp. gr., 1.16, contains 31.3 per ct. of chlorine. The pint will consequently contain  $(8457 \times 31.3)$  2647 grs. of chlorine.

Sesquichloride of iron,  $\text{Fe}_2\text{Cl}_3$  has for its composition 56 grs. of iron to 106.26 grs. chlorine, and by proportion the 2647 grs. chlorine require 1398 grs. iron to combine with it.

Again, although there appears to be an uncertainty as to the precise composition of subcarb. of iron, it is generally regarded as a hydrated sesquioxide of iron,  $\text{Fe}_2\text{O}_3 + 2\text{H}_2\text{O}$ , containing a small but variable amount of carb. of protoxide. The equivalent for the hydrated oxide is 98, or when calcined 80. The equivalent of iron in these two forms would be the same, or 56. If the preparation of iron is the hydrated, by means of this proportion, as 56 iron : 98 hyd. sesquiox. : : 1398 iron, we obtain 2446 grs. of hyd. sesquiox. iron as requisite to saturate 1 pint of muriatic acid.

If the iron were anhydrous, the relative amount required would be  $\frac{80}{56}$  as much, or 1997 grs. In either case the quantity is considerably less than that given in the formula, namely 2880 grs. Another remark should be made, as still further increasing the disparity between the calculated and given proportions, and that is the considerable escape and loss of muriatic vapors, during the oft prolonged heating and digestion.

This gas is given off freely, even at moderate temperatures,

and more so as the heat is raised, and the watery solution does not become permanent until nearly half of the gas has escaped. Now the quantity of iron dissolved decreases with the loss of acid, and as this depends on the solubility of the iron preparation, some requiring a much more prolonged digestion than others, we have consequently every reason to fear, that this valuable medicinal agent, will be found to vary widely in its therapeutic effects, as well as in its chemical relations.

In the formula of our Pharmacopœia, there is no provision made to compensate for this variation of strength, and even if half the acid should have evaporated, we are still required to add three pints of alcohol to the remainder.

I have already shown that the quantity of acid in the formula, one pint, would require for its saturation 2446 grains of hydrated ox. iron, provided there was no loss by evaporation and escape of gas. On this latter supposition, the whole amount of the finished tincture would measure 4 pints or 64 fluid ounces, and this would give 38 grains\* in each fluid ounce. The iron is therefore in excess 48½ grs., but as it is not an expensive preparation, it might be safely used to insure against accidental impurities, and also to thoroughly saturate the acid.

A much more important and practical consideration remains to be noticed, namely, how to provide against the loss of acid, or to make a proper compensation for it.

The remedy suggested will fortunately be found useful in a variety of cases, several of which have occurred in my own experience. It is briefly this : After digesting the subcarb. of iron and acid together, until the acid has dissolved all it is capable of, allow it to settle, and pour off the clear solution, or filter if preferred ; then evaporate the solution, with a gentle heat until it commences to crystallize upon cooling ; now add water until the specific gravity becomes 1.44, when cool. If now found to be turbid from a slight deposit of sesquioxide of iron, add a few drops of muriatic acid, and warm gently till clear ; when finished the specific gravity should be 1.44 at 60° Fahr. and it will then

\* According to Dr. Squibb's observation there is a contraction in volume when the alcohol is mixed with the solution of iron, of about 2 per cent., which would slightly increase the calculated strength per oz.

yield per fluid ounce, 130.6 grs. sesquioxide of iron by precipitating with ammonia and igniting.

This solution is the "*Liquor Ferri Sesqui Chloridi*," one fluid ounce of which, when mixed with three fluid ounces of alcohol, will form the *Tinct. Ferri Chloridi* always of uniform strength, and containing 22.8 grains of iron per fl. ounce. The Dispensatory states, that in the present formula, no excess of acid exists, and, provided the digestion is continued long enough, no excess can exist, as I have already shown. The neutral solution, however, when diluted with alcohol and exposed to the action of light and air, is liable to absorb oxygen and deposit iron. This, perhaps, could be avoided by adding a definite quantity of muriatic acid to the solution.\*

I have stated that cases occur, in which the above mentioned method of preparing a normal solution of iron can scarcely be dispensed with without loss.

I allude now to those accidental mishaps which occasionally are met with, even in the best regulated stores; such as the tilting over of the evaporating dish, and consequent loss of a portion of the acid, or the solution being forgotten until nearly dry, &c.; such events occurring, the loss of the residue must follow, if it were not for the remedy still available. In these and similar cases, pursue the same method, pour off and evaporate till the solution commences to crystallize, and then make up to a specific gravity of 1.44 by the addition of water.

In this proceeding, the employment of an accurate hydrometer will facilitate the necessary trials very much, or, still better, the 1000 grain bottle. These instruments are so indispensable, that every druggist should be supplied with them. In situations, however, where they cannot be obtained, an ordinary 2 oz. vial with a narrow neck may be employed with advantage for the same purpose.

In the Prussian Pharmacopœia there is an officinal preparation called *Liquor Ferri-Sesqui Chloridi*, made, however, in a different manner from the one already stated. Its advantages

\*A slight excess of acid appears further desirable, as tending to the formation of an ether, which is thought by many to increase the medicinal efficacy of the tincture.



are, its permanent character and its being a pure sesquichloride. It is the solution which I prefer keeping for making the muriated tincture and other preparations.

The formula is as follows, with some unimportant exceptions :

Take of Iron wire free from rust, ℥ii.

Muriatic acid, fl. ℥viii.

or sufficient quantity,

Water, . . . ℥v.

Mix, and digest with a gentle heat, adding more acid, if necessary, until all the iron has disappeared, when the solution is complete add to it half as much more muriatic acid, previously diluted with 3 oz. of water, then raise the temperature to boiling or nearly so, and pour in by successive portions about 2 fl. ℥. of nitric acid, or until a drop tested with a dilute solution of red prussiate of iron, gives neither a green or blue precipitate.\* Evaporate with a gentle heat, until upon cooling it begins to crystallize, add 6 oz. water, and if any iron oxide has separated, add enough muriatic acid to re-dissolve it with the aid of a gentle heat. Again evaporate to 6 fl. ℥., and finally add water to make the whole measure  $10\frac{1}{2}$  fl. ℥. The sp. gr. of this solution is 1.44, and is of the same strength as the solution previously spoken of, and can be made into the muriated tincture in the same manner.

As connected with this subject I may here remark, that a *Syrup of Perchloride of Iron*, which is occasionally prescribed, may be readily and extemporaneously made as follows :

℞. Liq. Ferri Sequichloridi fl. ℥i.

Syrupi . . . fl. ℥x.

Misce.

This is identical with that prepared by Beral's formula, which is made by dissolving one part dry chloride of iron in 23 parts of syrup.

\* The first part of this process is best effected in a flask ; after the iron is dissolved, transfer the solution to an evaporating dish, which should not be more than one-fourth full, on account of the extrication of nitrons vapors towards the close, occasioning sometimes considerable frothing up of the materials.

## ON BAUME TRANQUILLE.

BY WILLIAM C. BAKES.

It would be supposed that the rapid advancement which Pharmacy has made during the past few years, would render it unnecessary for the pharmacist to seek for "specialities" among the discarded formularies of ancient *Pharmaciens*; but such is not the case. Ever and anon some enterprising member of the profession, in his endeavors to meet the requirements of the physician, introduces either an old remedy under a new name, or a modification of an old recipe under its original title.

Some of our practitioners are prescribing a French preparation, formerly much used in this city, but of late years nearly obsolete, and as there seems to be an inquiry for it, I furnish the formula for publication in the Journal, so that if it possesses the merits claimed for it, all may share them alike, and this valuable preparation be restored to the position which it formerly occupied among the much valued class of anodynes.

*Baume Tranquille.*

Take of Fresh Belladonna leaves.

" Conium "

" Hyoscyamus "

" Stramonium " each  $\text{ʒiv. ʒiii.}$ Opium  $\text{ʒi.}$ Olive Oil  $\text{Ovj.}$ 

Mix the whole together and boil over a slow fire, strain and add

Oil of Sweet Marjoram,

" Sage,

" Wormwood,

" Lavender,

" Thyme,

" Peppermint,

" Rue, of each  $\text{ʒix.}$ 

As the fresh leaves are not always accessible, the *Baume* may be prepared from the inspissated juices or extracts, in the following manner.

Take of Extract of Belladonna,

“ Conium,

“ Hyoscyamus,

“ Stramonium, each  $\text{ʒi}$ .

Aqueous Extract of Opium  $\text{ʒii}$ .

Dissolve the extracts in a little boiling water, and add

Olive oil, Oiiiss.

Strain, and when cool add the same proportion of oils as in the preceding formula.

This process has the advantage of being more expeditious, and furnishes a preparation of equal strength with that from the recent leaves.

A remedy containing the same ingredients, and made in a similar manner, substituting Glycerine for the Olive Oil, has been prescribed under the name of *Baume Anodyne*; as an application for ear-ache, which the pharmacist is frequently called upon to furnish, these preparations answer an admirable purpose, being both prompt and effectual.

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#### ON THE ROOT OF FRAZERA WALTERI.

By W. R. HIGINBOTHOM, of Bermuda.

(From an Inaugural Essay.)

The *Fazera Walteri*, called also American Columbo and American Gentian, is an indigenous plant found along the base of the Alleghany mountains in the southern and western States, and also in Arkansas and Missouri, in great abundance. The root has been subjected to a chemical investigation, with results but partially satisfactory.

The infusion has a bright reddish brown color, an agreeable bitter taste, and a decided acid reaction. Oxalate of ammonia causes a precipitate, and sesquichloride of iron occasions a greenish black color. The solutions of the acetates of lead and of nitrate of mercury immediately coagulated it. Lugol's solution and bichloride of mercury no change. From these tests the presence of *lime*, an *organic acid*, and *gummy matter* is inferred, whilst *starch* and *albumen* are absent.

An ethereal tincture made from washed ether had an amber

color, reddening litmus freely, and had a bitter taste. This was evaporated to a soft extract, and treated with boiling water. A yellow mass, consisting of wax, fatty matter, resin and brilliant yellow coloring matter remained undissolved, the latter having a bitter and nauseous taste, and partially soluble in chloroform, oil of turpentine and alcohol. The watery liquid was filtered until transparent; it had a sharp acid, scarcely bitter taste, and on evaporation afforded no crystalline matter. The clear watery acid liquid gave a clear olive green color with sesquichloride of iron, and a bright emerald green with sulphate of copper. Nitrate of mercury, solution of gelatin and a solution of an alkaloid occasioned no change. These reactions prove that the acid is not tannic or gallic, and that it is probably an acid peculiar to this plant. Various experiments were made with a view of isolating it without success.

When the alcoholic extract was dissolved in water and precipitated with subacetate of lead, and the filtered liquor deprived of lead by sulphuretted hydrogen and evaporated, an extract of a pure bitter taste results, which is chiefly bitter extractive. The root after extraction by alcohol and drying, was percolated with cold water. The percolate was nearly black from its depth of color, had a sweetish mucilaginous taste, and, on standing a short time, formed quite a firm jelly, which proved to be pectin associated with glucose.

The chemical constitution of this root is evidently allied to that of gentian, and has nothing in common with columbo except its bitterness, and this is due to another principle. American gentian is, therefore, a more appropriate name than American columbo.

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#### NOTE ON A SOPHISTICATED PRECIPITATED CARBONATE OF IRON.

MR. EDITOR,—The following notes, which I made at the time, are at your disposal:

In preparing Muriated Tincture of Iron recently, I was much annoyed at the insolubility of the Prec. Carb. Iron, a new lot which I had just received. After a prolonged digestion of 3 ounces for five or six hours with the requisite amount of muri-

atic acid, I added an additional quantity of acid and continued the digestion several hours more.

A large amount apparently remained undissolved ; allowing this to settle, and pouring off the clear solution, I threw the bulky sediment on a filter and washed with water thoroughly. When dried, it resembled white clay, and weighed  $1\frac{1}{4}$  oz., which represents this moderate adulteration as 42 per cent. of the whole weight. But this was not all : upon evaporating the acid solution, together with the wash waters of the sediment, it became encrusted over with a crystalline mass ; pouring off the now concentrated solution, and washing the crystals with cold water and drying, I obtained a further adulteration of 80 grains, or nearly 6 per cent. of fine silky crystals, white, and resembling sulphate of quinine. Subjecting these impurities to appropriate tests, it is evident that the first mentioned insoluble residue is alumina, while the crystals are hydrated sulphate of lime deposited from the hot solution.

Can you inform us, Mr. Editor, by what ingenious process this lot of Prec. Carb. of Iron has been manufactured ? for I imagine the whole compound has been thrown down together by some unscrupulous chemist, who was more concerned about the quantity than the quality of the article.

Yours, truly,  
W. H. PILE.

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#### NOTE ON THE PREPARATION OF CHLOROFORM, AND OF OIL OF CLOVES.

BY THE EDITOR.

Recently at the invitation of Mr. Benjamin J. Crew, of the firm of Crew, Rogers & Crew, manufacturing chemists of this city, the Editor of this Journal had the opportunity of examining the apparatus employed by these gentlemen in the manufacture of chloroform and oil of cloves. The chloroform still is peculiarly located, being sunk in the ground ; the top of the still is on a level with the first floor of the laboratory building, whilst the body of the still occupies a circular pit, walled with brick, furnished with a lateral opening into the common sewer, into which the calcareous residue of the process is allowed to escape.

The advantage derived from this arrangement is the saving of the labor and expense of elevating the chloride of lime to the second story, which would be necessary were the still above ground.

The still is constructed of boiler iron, is about six feet in diameter, and eight feet high, surmounted by a dome-shaped top of cast iron, the apex of which is extended vertically by a conical leaden neck to the height of five feet, when it bends and connects with the condensing worm. This consists of 150 feet of inch and a quarter lead tube coiled in a large cask six feet in diameter, the water in which is constantly renewed by a hydrant. There are several lateral faucets to the still at various heights to ascertain the elevation of the contents during the reaction. The dome is penetrated by a manhole through which the charge is introduced, and which is closed afterwards by a clamp and screw pressing on a cast iron plate with gum-elastic cloth beneath. A shower jet is placed within the base of the neck, connected with the hydrant, by means of which an excessive reaction may be moderated, though it is rarely needed. The "charge" of chlorinated lime is 500 pounds. At the side nearly over the still a platform scale is placed, on which a large wooden tube is supported. Into this the chloride of lime is put and mixed by a stirrer with sufficient water to give it fluidity and to break up the lumps, when it is run into the still, by removing a plug in the bottom of the tub directly over the manhole of the still. Seven and a half gallons of 95 per cent. alcohol are then introduced, and immediately after the remainder of 200 gallons of water requisite for the charge. The opening is now closed, and steam admitted so as to blow directly into the still from the pipe which enters near the bottom, so that in its exit the ingredients shall be thoroughly agitated. As soon as the reaction commences, which with good chloride and steam of 45 to 50 pounds pressure is in about half an hour, the steam is stopped off, and the operative gives his chief attention to the condensing arrangement. The greater part of the chloroform comes over in the first ten minutes, but to get the last portion, half an hour is requisite. The workman stands at the exit tube, out of which a stream of distillate pours sufficient to fill a gallon bottle in less than a minute at first, and changes the bottles as fast as

they are filled. When the distillation subsides, steam is again let into the still until the last traces of chloroform and of undecomposed alcohol are driven over.

The crude chloroform, after repeated washing with water, is first re-distilled in a copper still of 150 gallons capacity, which separates from it a large quantity of black heavy oil, having an extremely suffocating odor. The distillate is then agitated with sulphuric acid in a large leaden revolving box, moved by steam; it is then drawn off, and on standing, until the acid separates, the chloroform is decanted into another vessel and agitated with strong liquor potassæ, again decanted after separating, and distilled a third time, rejecting about five per cent. of the last portion which is reserved for subsequent purification. The chloroform, thus obtained, will average in quantity thirty pounds of sp. gr. 1.495, and possess a degree of purity that fully fits it for medicinal use.

The merit of this still is its economy of labor, as one operative can manage it and work off five charges (2500 lbs.) of chloride in ten hours, which produces 150 pounds of purified chloroform, making the cost of labor for this part of the process less than a cent per pound.

*Still for oil of cloves.*—This is also constructed of boiler iron, cylindrical, about five feet high, and  $3\frac{1}{2}$  in diameter, and contains over 600 gallons. The dome-shaped top is surmounted by a leaden neck connected with an ordinary worm condenser; and is provided with a manhole for introducing the charge of cloves, which is about 350 pounds with 300 gallons of water. A square lateral opening exists near the base, which is closed by a clamp and screw pressing on an iron plate with a gum joint, the object of which is for conveniently removing the exhausted cloves, after the operation is concluded. The still is heated with pressure steam in a coil at the bottom. The distillate is received into a tall tinned vessel, of three gallons capacity, furnished with a funnel at top projecting down towards its centre, and from near the top, a lateral tube issues, bent upwards and then downwards so as to carry off the distilled water which collects above the oil. As the distilled water accumulates, it is returned into the still from time to time. About a day and a half are required to exhaust the charge with steam of an

average pressure of 45 lbs. The cloves are put in the still unground, which is found preferable to grinding them. The yield of oil is about 16 per cent. on the average, or nearly 60 lbs. from the charge of 350 pounds.

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#### ON THE FLUID EXTRACT AND THE SYRUP OF IPECACUANHA.

By WILLIAM PROCTER, JR.

An alcoholic fluid extract of Ipecacuanha has been recommended by the Committee of the College of Pharmacy, as a means of making the syrup. This extract is made of the strength of an ounce to the fluid ounce by evaporating the tincture made with alcohol .835 till reduced to the proper strength. This fluid extract contains the resin of the ipecacuanha, and its odorous fatty matter and wax, in part. When such fluid extract is employed to make the syrup by simply adding it to simple syrup, cold or hot, a cloudy syrup is obtained, which, while it is efficient and keeps well, separates by standing, and does not present a handsome appearance. With a view to remedy this objection, it is proposed to rid the fluid extract of all matter insoluble in cold water, so that when added to simple syrup, it shall produce a transparent medicated syrup.

The following formula is recommended :

Take of Ipecacuanha, in fine powder, 16 ounces, (troy)

Alcohol,

Water, of each a sufficient quantity.

Mix the Ipecacuanha with six fluid ounces of alcohol, pack it firmly in a conical percolator, cover it with a disc of muslin, and pour on alcohol until three pints have nearly passed, or until the drug is exhausted. Distil off the alcohol from this tincture till a syrupy residue remains; throw this into a pint of water; boil it until the last traces of alcohol disappear, the liquid becomes nearly clear, and the waxy oleoresinous matter separates, and adheres to the vessel. When the solution cools filter it through paper, and if it does not measure eight fluid ounces, mix the residue with sufficient water to make that measure, but if it measure more evaporate it carefully to that bulk. To this add eight fluid ounces of alcohol, and mix.



Thus made, fluid extract of Ipecacuanha is a dark reddish brown liquid having the odor of Ipecacuanha, well marked, after standing awhile, and mixes with water and syrup to form a transparent solution. If the process is carefully conducted it fully represents the drug, as Pereira states that the waxy matter separated from the tincture is not possessed of emetic properties.

*Syrup of Ipecacuanha.*

Take of Fluid Extract of Ipecacuanha, a fluidounce,  
Simple syrup, thirty-one fluidounces.  
Mix them.

Thus prepared syrup of ipecac has a fine bright color, is transparent, and may be made without heat, and, in fact, extemporaneously. It may be well to mention that in the forthcoming Pharmacopœia it has been proposed to increase the strength of this preparation to  $\mathfrak{zj}$  to  $\mathcal{Oj}$ , which is double the present strength, and equal to that of the wine. This will be a great improvement, and to make such syrup it will be simply necessary to mix a fluid ounce of this fluid extract, and fifteen fluid ounces of simple syrup.

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ON MAGNOLIA GLAUCA.

BY WILLIAM D. HARRISON.

(Extracted from an Inaugural Essay.)

This species of *Magnolia* is a small tree, usually from ten to thirty feet high in this latitude, and in the Southern States attains the height of forty feet. It is noticed in Massachusetts, but becomes more abundant in New Jersey and Maryland, and very abundant in Florida and Louisiana. It is called by the names, *Swamp Magnolia*, *Swamp Sassafras* and *Beaver Wood*. At the South, *White* or *Sweetbay*, is a name applied to it. It is confined chiefly to the tide water along the Atlantic coast.

The parts of the plant which have been used in medicine are the bark of the root, that of the trunk, and the fruit. The leaves are also medicinal.

*The bark of the root* is thick, tough, and spotted externally,

and smooth internally, of an aromatic odor and strong pungent, bitter taste, which is retained when the bark is dried.

*The bark of the trunk* is smooth, somewhat glaucous externally, and nearly white internally. When, recent, it has an aromatic odor and bitter taste, but by drying, these are entirely lost. *The leaves* are deep green above and glaucous beneath. When bruised they have a disagreeable odor and a pungent bitter and acrid taste, which are entirely lost by drying. *The flowers* are highly and very agreeably odorous, and perfume the atmosphere where they grow in abundance.

*The fruit* is conical, an inch to an inch and a half long, at first green, then of a pale red, composed of numerous cells, each opening externally by a fissure through which the deep red or scarlet seeds escape and hang by a filament. These are about the size of a pear. The kernels of the seed are extremely pungent and acrid to the taste, and irritate the throat when chewed.

#### CHEMICAL EXAMINATION.

This species of *Magnolia* appears to have attracted but little notice from chemists. The bark of *Magnolia grandiflora* was found by Dr. Stephen Procter to contain a crystalline principle analogous to the Liriodendrin of Prof. Emmet, in many of its properties.

*Bark of the root.*—An infusion was made in the proportion of an ounce to four fluid ounces of water. Its reaction was slightly acid, it was not precipitated by alcohol, very slightly by subacetate of lead, slightly by oxalate of ammonia, and not at all by nitrate of mercury or tincture of iodine.

When distilled with water, the recent bark affords an opalescent distillate from which a minute proportion of volatile oil separates on standing and floats upon the surface.

Half a pound of the dried bark was exhausted with alcohol .95 per cent., and when evaporated spontaneously afforded a hard brownish black extract, possessing a spicy odor and bitter, pungent, acrid taste, which caused a sense of burning in the throat when swallowed. This extract was treated (in the manner directed by Dr. Procter, (see vol.<sup>o</sup> 14th, page 89, of this Journal) with a mixture of 1 part of liquor potassæ and sixteen

of water, until everything soluble in that menstruum was removed, leaving a tough tenacious mass of the appearance of putty. This was soluble in ether and alcohol, but insoluble in water. It was dissolved in alcohol and thrown on a filter. Before the liquid passed, the filter was lined with colorless transparent, very fragile crystals, which crack under the teeth, and when freed from adhering resinous matter have little taste or odor. The liquid which passed the filter, when evaporated spontaneously, afforded a greyish brown resinous extract, having the odor and taste of the bark in a high degree.

A tincture of the bark made with diluted alcohol is less pungent than that with strong alcohol.

An acetic tincture was aromatic and very bitter and pungent. An ethereal tincture, by evaporation, afforded no crystals, but consisted of resin, odorous matter, and fixed oil, which caused it to stain paper like oil. A small portion of aqueous liquid, strongly reddening litmus, remained after the ether had evaporated, the nature of which was not determined.

*Bark of the trunk.*—When an alcoholic tincture of this bark is allowed to evaporate spontaneously, a reddish brown extract is obtained, possessed of a bitter taste, and the odor of the bark but has very little pungency. It did not afford a crystalline matter as did the extract of the bark of the root, when treated by liquor potassæ, &c., the latter dissolving it and precipitating it on the addition of sulphuric acid. When this matter was dried and redissolved and evaporated, no evidence of crystals was obtained. Other processes were tried to isolate a crystalline matter like that in the root, but they all failed.

A decoction of the bark affords a dark green precipitate with sesquichloride of iron indicative of some analogue of tannin.

The *leaves*, also, when treated, did not yield the crystalline principle, but afforded a bitter extract, volatile oil and an undetermined acid.

*The fruit.*—The medicinal virtues of the *Magnolia glauca* appear to be concentrated in the fruit. The alcoholic tincture is very pungent and bitter, and of a light red color. By evaporation it yields a black, resinous, soft extract, associated with a thick liquid which is exceedingly pungent and acrid, affecting the throat when tasted, and creating a sense of nausea.

The resinous part of the extract when treated by dilute liquor potassæ, and afterwards by alcohol, did not afford the crystalline matter. The ethereal extract of the fruit contains much fixed oil associated with acrid soft resin.

All parts of this *Magnolia* are more pungent when recent than after drying, and preparations made from the bark or fruit, are best made from the recent plant. The results of Dr. Procter with the bark of *Magnolia grandiflora* show that that bark owes some of its virtues to volatile oil, and that this oil is found much more abundantly in the recent than in the dried bark. The experiments here detailed indicate that the *Magnolia glauca* has an analogous constitution, but seems much less strongly impregnated with the volatile oil and other active principles.

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#### GLEANINGS FROM GERMAN JOURNALS.

By J. M. MAISCHE.

*Solid oil of mint*, pretending to have been imported into Hamburg from Japan, was examined by Gorup-Besanez, who found it to consist of the stearoptene of mint and of 18.66 per cent. sulphate of magnesia, which evidently had been intentionally added to impart a fine crystalline appearance to the product.—(Ann. der Chem. und Pharm. cxix. 245.)

*To recognize grape sugar beside cane sugar*.—O. Schmidt employs trisacetate of lead and ammonia, which produce with both sugars white precipitates, which after a while, particularly when heated, assumes a red color in the presence of grape sugar, but remains unaltered by cane sugar; a small quantity of the former mixed with a large proportion of the latter may thus be recognized by the red tint of the precipitate.—(Ann. der Chem. und Pharm. cxix. 102.)

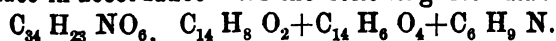
*Influence of silicic acid on fermentation*.—J. C. Leuchs states that silicic acid precipitated from water glass, produces fermentation in saccharine solutions, particularly after the addition of some tartaric acid, and generates the odor of beer yeast, afterwards of fruits, and finally of ether; in very dilute

solutions the odor of putrid yeast appears. Silicic acid does not lose this property by boiling with water or by repeated employment for fermenting and subsequent washing with water. A solution of sugar, containing alcohol and tartaric acid, fermented briskly with silicic acid, from which the gas was evolved, and amid the separation of a yeasty foam.—(Portfolio.—Dingler's Polyt. Journ. clxi. 400.)

*Amount of silver in photographs.*—Dr. J. J. Pohl, of Vienna, has estimated the silver in positive photographs taken upon ordinary albuminated paper; after drying them, at 100° C. (212° F.) he found 0.116 per cent. equivalent to 0.125 per cent. oxide and 0.183 per cent. nitrate of silver. The value of the material is, therefore, very insignificant.—(Zeitschr. f. Photogr. 1861, 139.)

*Analysis of carbonates and black oxide of manganese.*—Prof. H. Kolbe evolves the carbonic acid from a flask, dries it by passing it over cotton and chloride of calcium, and absorbs it in a Liebig's potassa-apparatus. After thus determining the carbonate of lime in the manganese, an excess of oxalic acid is introduced into the flask and heat applied; from the amount of carbonic acid now absorbed by the potassa, the amount of available binoxide of manganese is readily calculated.—(Ann. der Chem. und Pharm. cxix. 130.)

*Splitting of atropia.*—Prof. Ludwig and Pfeiffer endeavored, without success, to decompose this alkaloid by boiling with dilute sulphuric acid similar to solania, (Zwenger and Kindt), but on boiling it with chromate of potassa and dilute sulphuric acid, the liquid when of a certain concentration, turns green, needles of benzoic acid are sublimed, and the aqueous vapors excite to coughing from their contaminations with the same acid. The green residue when supersaturated with caustic potassa, generates alkaline vapors of propylamin, possessing the odor of herring pickle. The decomposition probably takes place in accordance with the following formula:—



Atropia = benzoic alcohol + benzoic acid propylamin.

(Archiv der Pharm. cvii. 181-182.)

*Acids of Benzoin.*—Hermann Aschoff obtained from Benzoin of Sumatra pure cinnamic acid, without finding benzoic acid; the white tears were entirely soluble in ether and contained 11.2 per cent. cinnamic acid. A second quality of Sumatra benzoin and several kinds from Siam did not contain a trace of cinnamic acid. He recommends the following ways for detecting cinnamic acid in the balsam; it is either boiled with milk of lime, the filtrate decomposed by muriatic acid and treated with bichromate of potassa and sulphuric acid, or with permanganate of potassa; or the alcoholic tincture is poured into water, the alcohol evaporated and the filtrate treated in the same way. The presence of cinnamic acid is manifested by the odor of oil of bitter almonds. Benzoin containing cinnamic acid is unfit for preparing benzoic acid for medicinal purposes.—(Archiv d. Ph. cvii. 153–157.) Kolbe and Lautemann obtained from Sumatra benzoin a mixture of 2 equiv. benzoic with 1 equiv. cinnamic acid, fusing at  $94^{\circ}$  C.—(Annal. der Chem. und Ph. cxix. 136.)

*An analysis of Anachuita wood* is published in Archiv d. Pharm. cvii. 176–179. By repeated fractional cohobation and agitation with ether, an oily liquid was obtained, possessing the odor of the wood; it was an aldehyde. The decoction was precipitated by acetate and subacetate of lead, which precipitated a tannin resembling that of catechu, gallic acid and a little arabin. The sulphide of lead obtained on decomposing these precipitates, contained some products of oxidation and a little yellowish resin. The filtrate after removing the lead, evaporating and treating with alcohol, separated uncrystallizable sugar and a gummy organic lime salt; more alcohol removed a pectinate. The filtrate evaporated and treated with ether, separated grape sugar, and the filtrate left on evaporation groups of sublimable warty crystals, and a thick liquid which, on evaporating spontaneously over sulphuric acid, left white needles, soluble in alcohol, somewhat less in ether and water, more freely in alkalies; they are the bitter principle, but are destitute of alkaline properties.

The thus exhausted wood yielded nothing of interest besides an acid and neutral resin, to acidulated and alkaline water,

alcohol and ether. The wood left 4.5 to 5 per cent. ashes consisting of carbonate of lime with little chloride of magnesium and sulphate of lime.

*Protosulphate of manganium*, free from iron, is prepared by Delffs, by treating black oxide of manganium with washed sulphurous acid gas, which does not take up a trace of iron. Other bases besides iron must be removed by treating previously with dilute nitric acid.—(Zeitschr. f. Ch. und Pharm. iii.)

*Aspidine* is the name given by Pavesi, of Mortara, to the following preparation containing the active principle of the root of male fern. 1 kilogr. of recently dried powdered root is displaced by alcohol and then by water; the two liquids are mixed, the alcohol distilled off and the residue boiled for a few minutes with 75 grm. slacked lime. After 24 hours rest, the precipitate is washed with water, dried and exhausted by boiling alcohol; the solvent is evaporated when an oleo-resinous substance is left possessing an acrid bitter and nauseous taste. It may be given in pills or in alcoholic and ethereal solution.—(Giorn. di. farmac. e di chim. di Torino.—Archiv d. Ph. cvii. 231.)

*Borax in milk*.—Prof. Kletzinsky states that borax is often employed to prevent milk from turning sour and to impart to it more consistence so as to make it appear more cream-like. This addition is detected in the ashes by boiling them with alcohol acidulated with sulphuric acid; the presence of boracic acid is ascertained from the brown color of curcuma paper and from the green flame of the burning alcohol.—(Polyt. Centr. bl. 1861, 224.)

*Detection of paraffine in wax*.—Prof. Landolt, of Bonn, recommends to warm the wax with an excess of fuming sulphuric acid, (Nordhausen oil of vitriol;) a complete destruction of the wax takes place, leaving a black gelatinous residue; paraffine is under the same circumstances very slowly attacked and remains as a transparent layer, readily separated from the fluid portion. Wax containing 50 and 75 per cent. paraffine, yielded 45 and 68 per cent.—(Schweiz. Zeitschr. f. Ph. vi. 170–171.)

*Test for gaseous sulphurous acid.*—Hugo Schiff employs paper moistened with solution of protonitrate of mercury which instantly assumes a gray color from reduced mercury; it is requisite to test with lead paper for sulphuretted hydrogen. Both gases are not present at the same time, as they decompose each other.—(Dingler's Journ. 1861, May.)

*Paraguay tea.*—Dr. Stahl Schmidt found that the distillate from Paraguay tea was opalescent, had a peculiar slight odor of tea and a taste resembling peppermint. From 18 lbs. he obtained 38 grm. caffeine = .44 per cent. or more than three times as much as Stenhouse, by the following process:—The decoction was precipitated by basic acetate of lead, the decanted liquid freed from lead by sulphuretted hydrogen, evaporated and the syrupy residue treated with hot benzole. On cooling, caffeine crystallizes in white needles, nearly chemically pure, which may be re-crystallized from water or alcohol.—(Poggendorf's Annalen, cxii. 441.)

*Extractum gentianæ.*—Considering the presence of pectin and pectase in gentian root, and the conversion of the former by the latter under the aid of a moderate heat into nearly insoluble pectic acid, Feldhaus urges the propriety of exhausting the root by digesting it for several days at a temperature of 45° C. (113° F.) On expressing the aqueous liquid, floccules of the acid remain behind intermixed with the ligneous portion of the root. The infusion is now evaporated to about  $\frac{1}{2}$  the weight of the root employed and mixed with an equal bulk of strong alcohol, and may now be easily strained; the residue is washed with 45 per cent. alcohol, strongly expressed and is then almost inert and but slightly bitter. The alcohol is regained by distillation and the extract left on evaporation (4 $\frac{1}{2}$  lbs. from 20 lbs. root) is rapidly and completely soluble in water, separating but few floccules on standing. Thus prepared very little pectin remains in the extract, it not being completely insoluble in diluted alcohol; but aside from the rapid solubility, the extract has no pasty consistence and is not liable to mould. The same process is applicable to other extracts.—(Archiv d. Ph. cvii, 294–298.)

*Castor.*—Dr. F. G. Geiss reports that the beaver is still found



in the neighborhood of Aken, on the Elbe, Germany, and that he has found the following method best for the preparation of castor : The sacs are carefully removed from the recently killed beaver, and freed from all adhering fat ; the open end is loosely tied, and the sacs then subjected to moderate and gradually increased pressure to expel gases. As soon as the membranes adhere closely to the contents, they are repeatedly painted over with wood vinegar, and the weights are afterwards removed. Any gas still contained in the bag is expelled by puncturing the place with a pin ; the bags are again pressed for 24 hours, the punctures are closed by a little collodium, and the whole left to dry in the open air, which is accomplished in from one to two weeks. The loss in weight is about one-fourth of the original. The complete expulsion of the gas is necessary to prevent partial decomposition. Only the full grown male beaver yields a hard and rapidly drying castor ; that of the female is softer, more difficult to dry and notwithstanding all precautions, remains soft in some places.—(Archiv der Pharm. cvii. 306–308.)

*A red coloring matter from Sorghum saccharatum*, called Baden red, is prepared, by A. Winter, by fermenting the cut and expressed stems, piled up under a shed to the height of several feet, and avoiding too high a heat by regulating the draught of air. The mass will have turned red or reddish-brown in about two weeks, is now dried, ground and macerated in cold water. The expressed mass is then treated with a weak potassa or soda lye, the liquor neutralized by sulphuric acid, and the red flocculent precipitate collected upon a filter, washed and dried. The coloring matter is readily soluble in alcohol, alkalies and diluted acids, and is printed upon silk and woollen fabrics by means of the ordinary tin mordants ; the colors thus produced are not affected either by sunlight, or washing with soap. It is stated that the preparation of this dye has been long known and extensively used in China.—(Allg. Deutsch. Telegraph.)

*Tima*, a new remedy for consumption, comes from Tampico, Mexico, and is used in the form of syrup, prepared by boiling

the fruit, together with the seeds of *Crescentia edulis*, Derv., with sugar, and adding a little oil of almonds. Professor Walz analyzed the fruit, and found butyric, acetic, tartaric and malic acids, resin, sugar, gum, pectin, humin and lignine; the ashes contain potassa, soda, little lime, phosphoric acid, magnesia, alumina.—(N. Jahrb. d. Ph. xv. 426.)

*Laudanum liquidum Sydenhami*.—L. Lade, of Geneva, has made some interesting experiments to ascertain the best menstruum for this preparation. He employed Malaga wine of 1.040 spec. grav. which left 17 per cent. extract; Swiss (Waadtland) wine of .995 spec. gr. containing  $1\frac{1}{2}$  per cent. extract, and alcohol of .931 leaving no residue. Of the saffron, cinnamon and cloves, Malaga wine dissolved 48, Swiss wine 54, and diluted alcohol 59 per cent.; these tinctures macerated with opium took up 60, 66 and 70 per cent. and increased in spec. grav. .031, .034 and .039 respectively. The amount of extract remaining on evaporation of these three tinctures was 23, 10, 10 per cent., from which, however, the solid ingredients of the menstrua must be deducted, so that Malaga wine has taken up 6, Swiss wine 8.5, and diluted alcohol 10 per cent. of its own weight. These experiments prove the superiority of diluted alcohol over Malaga wine, the solvent power of which appears to be materially impaired by containing 17 per cent. (3iv. per ounce) of sugar, extractive and salts.—(Schweiz. Zeit. f. Ph. vi. 157–160.)

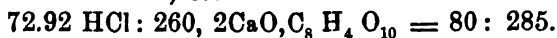
*Sticky plasters*.—The Schweiz. Zeitschr. f. Ph. vi. 169, recommends to sprinkle the plaster board, after the moisture has evaporated with lycopodium, and after rolling, the plaster may be kept without adhering to the paper. Freshly spread plasters, particularly in summer, or when to be carried a great distance, are prevented from adhering by lycopodium, which, previous to their application, is wiped off. Small quantities of turpentine, liquid storax, &c., for mixtures or pills, are best weighed out upon paper sprinkled with lycopodium, which prevents them from adhering.—(Schweiz. Zeitschr. f. Pharm. vi. 169.)

## ON THE SOLUBILITY OF CREAM OF TARTAR IN ACIDS AND ITS PURIFICATION FROM LIME BY MURIATIC ACID.

By DR. TENNER, of Bern.

It was proposed by Wittstein and adopted by the Prussian Pharmacopœia to digest for 24 hours in a water-bath ten parts finely-powdered cream of tartar, with the same quantity of water and one part of concentrated muriatic acid. If well washed, the greatest part of the lime is removed. On evaporating the acid liquid, and cooling, a gelatinous mass is obtained, but faintly smelling of muriatic acid, and consisting of a mixture of crystals of bitartrate of potassa, chloride of potassium, chloride of calcium, muriatic and tartaric acids. To ascertain the reaction, the behaviour of the neutral tartrate of lime and of pure cream of tartar to muriatic acid was observed.

Tartrate of lime was prepared by precipitating neutral tartrate of potassa with chloride of calcium. Two ounces of this limesalt were digested for several hours at a temperature of about  $44^{\circ}$  C. ( $111^{\circ}$  F.) in a mixture of  $\frac{1}{2}$  ounce muriatic acid sp. grav. 1.1644 and  $7\frac{1}{2}$  oz. water; solution took place rapidly and completely. After standing two days at ordinary temperature the precipitate was collected, washed and dried; it weighed 11 drachms 14 grs., and 286 grs. were consequently dissolved. Half an ounce of muriatic acid of 1.1644 sp. gr. contains 33.3 per ct. anhydrous HCl, or 80 grs.; tartrate of lime is therefore dissolved with complete decomposition and the formation of chloride of calcium; for



This behaviour suggested the idea that the increased solubility of cream of tartar in some acids was owing to its decomposition amid the production of the corresponding potassa salts. The following experiments were then made: Pure cream of tartar in excess was treated with diluted acids and with the potassa salts of the same. Starting with muriatic acid, which contained 80 grs. HCl in 8 oz., the acids and salts were employed of such strength as to correspond by their equivalent weight with the muriatic acid. They were all digested for 24 hours at about  $44^{\circ}$  C. with frequent agitation, and then exposed for

48 hours to the common temperature of about 20° C. The residue was now collected, washed with very little water, and the dissolved portion ascertained from the loss. The results were as follows:—

Mixture.		Dissolved Cream of Tartar.		Proportion.
1.	8 oz. water.	28.50 grains.		1: 135
2.	“ “ and 330 grs. $\bar{T}$	36.75 “	“	1: 104
3.	“ “ “ 80 “ $\text{HCl}$	274. “	“	1: 14
4.	“ “ “ 163 “ $\text{KCl}$	4.75 “	“	1: 808
5.	“ “ “ 119 “ $\text{NO}_5$	307.50 “	“	1: 12
6.	“ “ “ 222 “ $\text{KO NO}_5$	6.75 “	“	1: 568
7.	“ “ “ 88 “ $\text{SO}_3$	225. “	“	1: 17
8.	“ “ “ 191 “ $\text{KO SO}_3$	7.25 “	“	1: 530
9.	“ “ “ 132 “ $\bar{\text{A}}\text{o}$	30.75 “	“	1: 124
10.	“ “ “ 216 “ $\text{KO}, \bar{\text{A}}\text{o}$	55.50 “	“	1: 69

If cream of tartar was as readily decomposed by hydrochloric acid as tartrate of lime, there ought to have been dissolved in experiment No. 3 at least 412 grains; but here, as well as in Nos. 5 and 7, the decomposition is incomplete. Tartaric and acetic acids increase the solubility but little, while chloride of potassium and nitrate and sulphate of potassa decrease it considerably. Acetate of potassa is decomposed by the bitartrate on digestion; the liberated acetic acid appears to be partly recombined on cooling.

There are three points to be observed in the purification of cream of tartar from lime by muriatic acid: 1. Action of the dilute muriatic acid upon all particles of the cream of tartar. 2. Complete removal of the acid liquid; and 3. Employment of sufficient muriatic acid.

Duflos' original direction to treat the crystals of cream of tartar with the dilute acid, will perhaps never accomplish the entire separation of the lime; the finer it has been powdered, the better will its purification be effected; but it was impossible to obtain the preparation free from lime; by following the directions of the Prussian Pharmacopœia, it will, however, be sufficiently pure for all pharmaceutical purposes.

The acid is best removed, by stirring the mixture repeatedly in water and decanting; the proportion of lime remaining be-

hind is very small, if the washing is effected immediately after digestion; if the mixture is set aside for 24 hours, it will be mixed with crystals of bitartrate of potassa containing lime, which cannot be purified by washing.

Cream of tartar is obtained entirely free from lime, if the acid mixture is completely dissolved in warm water, and the solution then evaporated with constant stirring until it has double the weight of the salt employed, when it is to be rapidly washed out.

The requisite quantity of muriatic acid depends on the amount of lime present; the more of it is employed, the easier will be the removal of the latter, but the greater likewise the loss of cream of tartar; for experiment 3 shows that  $\frac{1}{2}$  oz. of concentrated muriatic acid will dissolve 274 grs., or somewhat more than its own weight. A quantity of muriatic acid somewhat larger than just sufficient for the decomposition of the limesalt, will probably suffice in all cases. When evaporating with larger quantities, it is for this reason advisable to make an estimation of the lime and calculate the necessary quantity of muriatic acid, 1 part of which, to 10 of cream of tartar, will, in most instances, be more than sufficient. 100 carbonate of lime are equivalent to 260 tartrate of lime, and to 70.8 HCl or 212.4 muriatic acid sp. gr. 1.164 of 33.8 per cent.

The use of thus purified cream of tartar in preparing tartrate of potassa, or of potassa and soda, &c., has the advantage that less water is necessary, that the crystallization is not disturbed by the subsiding pulverulent tartrate of lime, and that the iron and other coloring matters have been completely removed by the muriatic acid; the loss of cream of tartar is thus compensated for.

14lb cream of tartar, containing 8.8 per ct. or nearly  $1\frac{1}{2}$ lb tartrate of lime, yielded by the process of the Prussian Pharmacopœia 12lb pure cream of tartar, showing a loss of  $\frac{2}{3}$ lb, or 5.5 per ct., and gave  $17\frac{1}{2}$ lb clear Rochelle salt. Of cream of tartar containing lime, 4 parts yield usually  $4\frac{1}{2}$ , rarely 5 parts of this double salt; the above 14lb would consequently have furnished 15.8lb to 17.5lb, or, under the most favorable conditions, not more than in this instance.

If the acid liquid is precipitated by milk of lime, the tartrate of lime will usually have a yellowish color due to iron, which renders it unfit for the preparation of tartaric acid. Even if the acid is not entirely neutralized, the precipitate contains a portion of it. For complete saturation, a little more of burned lime than one-fourth the weight of muriatic acid will be necessary.

The cream of tartar free from lime, with which commerce is supplied from Würtemberg, does not yield such purely white preparations as that obtained by the above process; but it is well adapted for the tartrate of iron and potassa.—*Schweiz. Zeitschr. f. Ph.* vi. 160–65. J. M. M.

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#### ON THE PREPARATION OF CHLOROFORM.

By B. Hiasch, of Gruenberg.

M. Pettenkofer's paper on the same subject (see Amer. Journ. Ph., 1861,) has induced the author to publish his observations, made during the years 1852–54, in Berlin, under the direction of Wittstock. The chloride of lime was passed through a wire sieve to break up all lumps, and immediately mixed with sufficient cold water to produce a thin past, which was poured into a still, and water added to make its quantity four times that of the chlorinated lime. Alcohol of 90 per ct., Tralles (sp. gr. 834,) amounting to from  $17\frac{1}{4}$  to 20 per ct. of the chlorinated lime, or a corresponding quantity of weaker spirit, deducting at the same time the equivalent weight of water, is carefully stirred into the mixture, the head is luted on and connected with a refrigerator. Not more than two-thirds of the still must be filled by the whole mixture, so as to give room for the rising of it during the reaction. A moderate fire is at once applied, and the temperature in the still allowed to rise to 34 or 36° R. (108.5 to 113° F.), when all the fire is immediately withdrawn. The proper temperature depends on the quantity of the material, on their relative proportions, on the shape and size of the still, but principally in an inversed proportion on the strength of the hypochlorite of lime, which for this reason must previously be carefully ascertained, and, finally, on the length of time necessary

to heat the mixture to a certain degree. The slower it is heated, the lower ought the temperature to be; when heated rapidly, it may become a few degrees hotter without any disadvantage. After the removal of the fire, the temperature usually sinks to 102 or 104° F., remains stationary for about half an hour, and then commences to rise again; this rise of temperature is higher, the less and the slower it had previously decreased. The highest degree attained in about 96 operations between 62 and 74° R. (171.5 and 198.5° F.) If the thermometer has fallen to below 30° R. (100° F.) the reaction will not commence for several hours, and it is preferable to heat the mixture a few degrees higher.

When the temperature has risen to 122° F., chloroform begins to pass over, and with the constant and rapid rise of the thermometer, the distillate soon runs in a continuous stream. After the highest heat has been reached, the last portions of chloroform are carefully distilled by a moderate heat, and finally the remainder of the alcohol, which is detained by the chloride of calcium with a certain force so that the thermometer reaches 213 to 214° F., before the last portions are expelled. If now a second distillation is undertaken, the fire ought to be slower than with the first one, because the still and its surroundings are still warm. The weak spirit obtained by distillation, and by washing the chloroform, is, after ascertaining its strength, used for the second operation. An increase of the alcohol over 17½ per ct. was never accompanied with an increase of the yield; indeed, 100 lb. chloride of lime, containing 30 per ct. active chlorine, require of the above alcohol but 3.178 lb., according to the following formula:  $2(C_4H_9O_2) + 8(CaCl + CaO + ClO) = C_2HCl_3 + 3(CaO + C_2HO_3) + 13CaCl + 8HO$ . Practically, 5½ to 6 lb. alcohol were used, but the author recommends not to decrease the quantity below 15 or 17½ per ct. as it is preferable to have some alcohol in excess, than to lose chlorine uncombined.

The chloroform obtained as above, is freed from the spirituous portion, by a separating funnel and now contains chiefly some alcohol as impurity, which is removed by repeated washing with water; when agitated with an equal volume, its first loss is about 15, the second time 6 or 7, the third time about 3 per ct. by

volume; on shaking it a fourth time with water, the loss is very small, and the specific gravity of the chloroform is now 1.498 to 1.499, and was once obtained as high as 1.501. The loss by weight of the crude chloroform, equivalent to 25 per ct. by measure is only about 12 or 13 per ct., because water removes chiefly the alcohol. The wash waters contain a variable quantity of chloroform, held in solution by alcohol, and obtainable by distillation and washing. The product now contains a small proportion of water and alcohol, and some heavy chloric ether,\* the latter of which is probably the cause of the coloration of chloroform by sulphuric acid. To free it from these impurities, the chloroform is agitated with about 5 per ct. of dry chloride of calcium, decanted into a dry retort and rectified in the water-bath, the temperature of which ought to be preserved at 56° R. (158° F.), when 98 per ct. are obtained in a perfectly pure state, so that sulphuric acid has no effect even after a contact for several days. If the distillation is then continued with a higher heat, a single drop of the distillate will color several drachms of sulphuric acid dark-brown, which proves the correct separation by this method. A black inodorous liquid remains in the retort, which from 50 lb. chloroform, varies from a few drops to two ounces in amount. The chloride of calcium will yield when distilled with water, a little impure chloroform which may be preserved for subsequent purification.

The author then gives the results of a series of 18 distillations, 17 of which were made with the following quantities: 40 lb. chlorinated lime of 30 per ct. chlorine, 7 lb. alcohol of 90 per ct., 160 lb. water. This mixture was heated to a temperature between 32° and 37° R. (104 and 115° F.); in each case, the time was carefully noted in which the thermometer fell to its lowest point, also the temperature to which the mixture rose spontaneously, the quantity of crude chloroform obtained, and the loss by volume on agitating with an equal bulk of water. The following comprises the entire result of three series:

\* This heavy chloric ether which was formerly officinal in many European Pharmacopœias, under the names of Aether (s. Naphtha) chloratus, s. chloricu, s. s. bichloricus, is, according to Schloosberger, a mixture of chloral, aldehyde, acetic ether, &c. Hager prepares it by distilling a mixture of 1 p. chlorinated lime, 5 water, and 1 alcohol.



715 lb. chlorinated lime of 80 per ct., = 214.5 lb. active chlorine yielded 50 17-82 lb. washed chloroform = 23.557 per ct. of the chlorine; alcohol used 48½ lb.

605 lb. chlorinated lime of 82.6 per ct. = 197.28 lb. chlorine yielded 44 13-16 lb. = 22.721 per ct. of the chlorine; alcohol used 42 8-16 lb.

732 lb. chlorinated lime of 29 per ct. = 212.28 lb. chlorine yielded 48½ lb. = 22.729 per ct. of the chlorine; alcohol used 40½ lb.

The appearance of chlorine vapors, the author believes to be caused by overheating; he has never met with them. When steam is employed, it is suggested to keep the mixture at a temperature near 82° R. (104° F.) until it commences to rise spontaneously. To pass the steam directly into the still is not advisable, except for driving over the last portions of alcohol and chloroform. Alcohol free from fusel oil, is not deemed requisite, inasmuch as ordinary crude spirit gave a product quite as good. If operating with the above precautions, the employment of carbonate of soda for washing is entirely unnecessary; but a single washing with water is insufficient; it is recommended to repeat it four times. It is to be presumed that Pettenkofer's chloroform, of which the specific gravity has not been stated, would lose by repeated washing at least 6 per ct., so that the most favorable yield would be reduced to 6.58 per ct. Of 2052 lb. chlorinated lime of 80.5 per ct., the author obtained 143.6 lb. = 7 per ct. chloroform well washed and of spec. grav. = 1.499. It is more instructive to compare the yield with the available chlorine.—(*Archiv. d. Pharm.* cvii. 187—158.) J. M. M.

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#### ETHER FORMED BY FERMENTATION.

Leuchs says (*Chem. centralb.*, No. 25, 1861,) that raisins from which the greater part of the sugar has been extracted by boiling, made into balls, laid under a glass bell, and kept at 64° F. form ether, which is also produced when cotton wool, moistened with a mixture of sugar, spirit of wine and water is placed under the same circumstances, and that ether is always found when these bodies are at the same time present in porous bodies.

## DESCRIPTION OF A GAS FURNACE FOR GENERAL CHEMICAL USE.

By JOHN JOSEPH GRIFFIN, F. C. S.

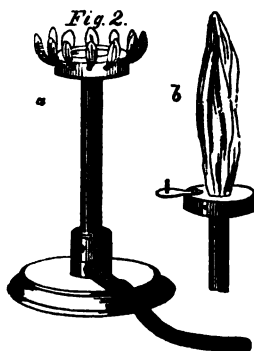


Fig. 4.

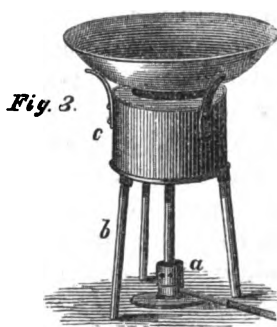
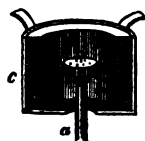
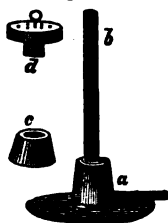


Fig. 1.



I have already published descriptions of several gas furnaces, adapted to special purposes. The present notice refers to a simple form of gas-burner, which, aided by suitable fittings, can be used as a convenient source of heat for most operations of the chemical laboratory and lecture table. It will boil a quantity of liquid, exceeding two gallons at once; it will raise a 4½ inch fire-clay crucible to full redness; it will fuse anhydrous carbonate of soda in greater quantity than is required for the analysis of a siliceous mineral; and it will melt small quantities of sterling silver. This amount of power is sufficient for most chemical operations that are not metallurgic.

*The Gas Burner.*—Fig. 1 represents the gas burner of this apparatus. The gas is supplied by the horizontal tube, whence it passes through a set of small holes into the box *a*, in which it mixes with atmospheric air that enters freely by the holes shown

in the sketch. The gaseous mixture passes up the vertical tube *b*, and is inflamed at the top, where it burns with a single, tall, blue flame, which gives no smoke, very little light, but much heat. In this condition, the apparatus differs from "Bunsen's Gas-burner" only in size. *c* represents a thin brass cap, which fits the air-box *a*, but moves easily round it. *d* is a flat, cast-iron box, with many holes round the margin, and a few small ones on the top. This box fits loosely on the upper part of the tube *b*, and when it is placed upon it, and the gas is lighted, the flame produced consists of a series of radiating jets, forming a horizontal circular flame of about 7 inches in diameter. Fig. 2—*a* shows a ring of horizontal flames thus produced, and *b* shows the single vertical flame.\* The ring of flame is suited to the purposes of boiling and evaporation; the single flame to ignition and fusion. The height of the apparatus represented by Fig. 1 is 12 inches; the bore of the tube *b* is 1 inch; and the diameter of the fire-box *d* is 4 inches.

Bunsen's gas-burner, whatever its size, is subject to two defects: sometimes the flame burns white and smoky, and sometimes it blows down, the gaseous mixture explodes, and the gas then burns with a smoky flame in the air-box *a*, Fig. 1. The remedies for these defects are as follows:—If the flame is white only when the gas is turned on very full, the remedy is to lessen the supply of gas; but if the flame continues to burn white at the top when the gas is gradually turned off, and the mass of flame slowly sinks, then the holes which deliver the gas from the supply pipe into the air-box are too large, and are placed too directly under the centre of the vertical tube *b*, Fig. 1, and these defects must be corrected in the instrument. Finally, when the flame blows down, it is because the supply of atmospheric air is too large in proportion to the supply of gas, and their relative proportions must be altered. To effect this alteration, the cap *c* is to be turned round on the air-box *a*, so as partially to close the holes, and thus lessen the supply of air. If, when the gas is alight, the flame needs to be lowered, first the supply of air is to be lessened, and then the supply of gas. If the flame is to be enlarged, first the supply of gas must be

\* Fig. 2 represents a small variety of this gas-burner, in which the head is not removable, but the efflux of the mixed gases is regulated by a sliding valve, which is represented by *b*.

increased, and then the supply of air. In short, to prevent the flame blowing down, the gas must always be first placed in excess, and then have the proper quantity of air adjusted to suit it by means of the regulator *c*.

*Arrangement for Boiling and Evaporation.*—Fig. 3 represents this gas furnace arranged for boiling and evaporation. *a* is the gas-burner, Fig. 1; *b*, an iron stool with three legs; *c*, a furnace body, or iron jacket, lined with plumbago or fire-clay. Fig. 4 shows the jacket and lining in section, and marks the position of the fire-box, *d*, of the gas-burner. This furnace is 14 inches high, and 9 inches in diameter. The three brackets fixed on the upper part of the jacket serve to support the vessel that contains the liquid that is to be boiled or evaporated. A porcelain basin of 16 or 18 inches in diameter can be thus supported. It is important to allow between the jacket *c* and the evaporating basin plenty of space for the escape of heated air, which ascends from the interior of the furnace. When the evaporating basin is of small diameter, it may be supported on iron triangles, placed in the furnace *c*. Fig. 4 shows that, around the vertical tube of the gas-burner, *a*, there is in the bottom of the furnace, *c*, a circular opening, which is of 2 inches diameter, and through which air passes freely, partly to feed the flame and partly to be heated by the flame, and be directed upwards in a continuous current upon the lower surface of the basin that is to be heated. The flame within the furnace burns steadily. No side currents of air agitate it. No part of it touches, or must be permitted to touch, the basin, which should receive its heat solely from the mass of ascending hot air. The gas-burner thus arranged, and supplied by a gas-pipe of  $\frac{1}{4}$  inch bore, burns about 33 cubic feet of gas in an hour, and the flame which it produces, acting upon water contained in an open porcelain evaporating basin, will heat from 60° to 212° F.,—

1 quart in 5 minutes.

1 gallon in 15 “

2 gallons in 30 “

and when the water boils it is driven off in steam at the rate of more than a gallon of water per hour. The method is consequently applicable to distillation on a small scale, and to numerous operations in pharmacy.—*Chem. News, London, Nov. 2, 1861.*

## ON THE ORIGIN AND PROGRESS OF THE PHOSPHORUS AND MATCH MANUFACTURES.

By G. GORE.

It has been wisely remarked, that Science "teaches us to be neglectful of nothing; not to despise small beginnings, for they precede, of necessity, all great things in the knowledge of science, either pure or applied." Not only should we not neglect scientific knowledge, but we should nurse as it were the smallest scientific truth; trying and watching the influence of various conditions upon it: increasing its distinctness or importance by modifying the surrounding circumstances: adding here a little and there a little, in order to magnify the extent or variety of its applications to human benefit. It is by such processes of treatment as this, slow and certain, that the little facts of the bygone alchemists, and of the more modern scientific investigators, have been extended and elaborated into the marvellous and magnificent realities of the present day.

Nearly all the great practical results of science of this period have had their origin in apparently useless and out-of-the-way observations. The expansive power of steam was known long before it was applied to any useful purpose. One observed and another observed the influence of various circumstances upon it; one invented and another contrived additional means of controlling it and directing it: one added and another introduced contrivances and pieces of accessory mechanism to increase its power, until from the simple and apparently useless fact of vapor expansion, it has grown to be the giant power of the earth, influencing the action and habits of nearly all mankind.

The curious facts respecting the action of liquids on metals, observed by Volta and Galvani, and the action of electric currents on magnets, have, by the repeated trials and applications of subsequent discoverers and inventors, been elaborated into the present system of electro-telegraphy, which bids fair to cover the whole earth with its wires, and to bring every human being into speaking distance with each other.

No reasonable and intelligent person can compare the com-

mencement of these things with their present developments without being impressed with the insignificance of their origin and the magnificence of their practical results, nor without being convinced of the importance of abstract scientific investigation. It is not my object on the present occasion to dilate upon the relations of abstract science to manufactures and practical life, but to give some account of the origin, progress, and present condition of the phosphorus and match manufacture.

In the year 1669 phosphorus was accidentally discovered in human urine as "a dark, unctuous, daubing mass," by Brandt, a merchant and alchemist, of Hamburg, while searching for a liquid capable of transmuting silver into gold. By some means it appears that at the same time Kunckell, a German chemist, gained some knowledge of the means of obtaining this substance, and communicated it to Kraft, of Dresden, who proceeded to Hamburg, and paid 200 dollars for a specimen "for him to make demonstrances to princes." Kunckell prepared some of the substance and exhibited it to the Courts of Saxony and Brandenburg, although it was not a very delicate or agreeable exhibition, "because the unctuous and daubing oiliness was not yet accurately separated from it, and, without doubt, it was very stinking, and therefore unpleasant." He also gave some to his friends, Professors in Germany, and to Mr. Link, of Leipsic, for sale. An account of it was published in his "*Laboratorium Chymicum*," Hamburg and Leipsic, 1716, p 660.

To afford some idea of the effect of Brandt's discovery upon his fellow-townsmen and upon alchemists generally, I quote the following:—"When, now, such like noble motives made that good old man Brandt to broil and to sweat much more by his excrements, one may easily guess how much at that time the whole heaven of Hamburg did hang full of fiddles as he brought forth out of it a lumen which, in the world, is counted the most perfect *agens intrinsicum*. There was then cried nothing but triumph and victory among the chymists. Those good people erected already in their thoughts so many hospitals and poor-houses that no beggar should ever more molest any man in the streets, made great legacies, and pious causes, and what not else. Besides, the other alchymists did encourage him yet more, and desisted not to make him believe how this was that same

fiery ghost of Moses that in the beginning moved upon the water, yea, his splendid shining face: the fiery pillar in the desert, that secret fire of the altar wherewith Moses burned the golden calf before he strewed it upon the fire and made it potable."

About the year 1670 the Honorable Robert Boyle, an Irishman and a philosopher of this country, brought over from Germany a youth named Ambrose Godfrey Hanckwitz to assist him in his chemical experiments, and having obtained information from Saxony of the method of extracting phosphorus, directed his assistant, Mr. Bilger, to instruct Hanckwitz to prepare some of it. Hanckwitz it appears succeeded in preparing an ounce of the substance and presented it to his master even before he received the instructions from Mr. Bilger. He was now sent by Boyle on a tour through "Holland, Italy, Naples, and Germany," to gain further information respecting "the marvellous lumen," but with little success, for he returned without meeting with "even one that could make even that poor daubing stuff as Kunckell's out of the usual microcosmical matters."

In No. 135 of the *Philosophical Transactions* of the Royal Society, dated March 26, 1677, page 87, is a paper by Boyle, entitled, "An Account of Four Sorts of Factitious Shining Substances, communicated to the publisher from very good hands, both in printed papers and in letters not printed." After speaking of three sorts, it says:—"The other is Phosphorus Fulgurans, which is a matter made both in a liquid, and dry form, and not only shineth in the dark and communicates a sudden light to such bodies as 'tis rubbed upon, but being included in a glass vessel, well closed, doth now and then fulgurate, and sometimes also raise itself, as 'twere, into waves of light. Differing from the Baulduinian stone which is to be exposed to some shining body, as the day, the sun, the fire, or some lighted candle, to receive light from these, whereas this fulgurating substance carries its light always with it, and when put in a dark place presently shows the same. Of which we have this further assurance given us, that a little portion of it having been kept two whole years hath not yet lost its power of shining. So that 'tis believed that if a considerable big piece was prepared of it, it would serve for a perpetual, or, at least, a very long lasting light."

In No. 150 (August 10, 1683), p. 289, is also given "An Account of some Experiments made at several meetings of the Royal Society by the ingenious Frederick Slare, M.D., F.R.S., and one of the the Royal College of Physicians, with some short applications of them to physical matters." He gives "A Parallel between Lightning and a Phosphorus," and relates a number of experiments of adding phosphorus to oil of vitriol, water, oil of turpentine, and oil of petroleum, producing combustion, &c. &c.

And in No. 196, p. 579, dated January, 1693, is "A paper of the Honorable Robert Boyle's, deposited with the Secretaries of the Royal Society, October 14, 1680, and opened since his death, being an account of his making phosphorus, &c." "September 30, 1680. There was taken a considerable quantity of man's urine (because the liquor yields but a small proportion of the desired quintessence), of this a good part at least had been for a pretty while digested before it was used. Then this liquor was distilled with a moderate heat, till the spirituous and saline parts were drawn off, after which the superfluous moisture also was abstracted (or evaporated away), till the remaining substance was brought to the consistence of a somewhat thick syrup, or a thin extract. This done, it was well incorporated with thrice its weight of fine white sand, and the mixture being put into a strong stone retort, to which a large receiver (in good part filled with water) was so joyn'd that the nose of the retort did almost touch the water. Then, the two vessels being carefully luted together, a naked fire was gradually administered for five or six hours, so that what was either phlegmatick or volatile might come over first. When this was done the fire was increased, and at length for five or six hours was made as strong and intense as the furnace (which was not bad) was capable of giving, (which violence of fire is a circumstance not to be omitted in the operation). By this means there came over good store of white fumes, almost like those that appear in the distillation of oyl of vitriol; and when those fumes were passed and the receiver grew clear, they were after a while succeeded by another sort, that seemed in the receiver to give a faint, blewish light, almost like that of little burning matches dipped in sulphur. And, last of all, the fire being very vehement, there passed over another substance that was judg'd more ponderous than the for-



mer, because it fell through the water to the bottom of the receiver, whence being taken out (and partly even whilst it stay'd there), it appeared by several effects and other phenomena to be such kind of substance as we desired and expected."

Hanckwitz, the servant of Boyle, and working under his direction, at the laboratory in Southampton Street, London, succeeded, by his own skill and perseverance, in considerably improving the process or manufacture, and produced phosphorus in larger quantities than any other person. He confirmed the opinion of his master, that it required an intense heat for its extraction; he states, "for in truth and fact it is not a work for gentlemen and cabinet chymists, but there is required for it an operator well versed in fires, to whom its mechanick and manipulation is well known." In an advertisement he states:—"For the information of the curious, he is the only one in London who makes inflammable phosphorus which can be preserved in water. Phosphorus of Bolognian stone, flowers of phosphorus, black phosphorus, and that made with acid oil, and other varieties. All unadulterated; every description of good drugs. He sells wholesale and retail. N. B. He sells solid phosphorus, wholesale, fifty shillings an ounce, and retail three pounds sterling the ounce."

In a "Historical Sketch of the Progress of Pharmacy in Great Britain, by Jacob Bell," it is stated, that "a house and shop with a laboratory, were built on the Bedford estate, in the year 1706, by Ambrose Godfrey Hanckwitz, who had carried on business as a chymist in the neighborhood since 1680. He was a maker of phosphorus and other chemicals, which were rare at that period, and which he sold in different parts of the country during his travels. His laboratory was a fashionable resort in the afternoon on certain occasions, when he performed popular experiments for the amusement of his friends. It opened with glass doors into a garden, which extended as far as the Strand, but which is now built upon. Four curious old prints of the laboratory in its former state are in the possession of its present proprietors, Messrs. Godfrey and Cooke, of Southampton Street, Covent Garden, also a portrait of Ambrose Godfrey Hanckwitz, engraved by George Vertue (1718), which he had distributed among his customers as a keepsake."

When we consider that 1000 parts of urine contain scarcely one part of phosphorus, and of this probably only a portion was obtainable by the processes first in use, we shall not be surprised at the statement of Boyle that "the liquor yields but a small proportion of the desired quintessence," or at the price of 50s. an ounce charged by Hanckwitz for his product. Even an improved process, purchased and published by the French Government in 1737, yielded, under the direction of Hellot, Geoffroi, Dufay, and Duhamel only four ounces of phosphorus for every five hogsheads of the liquid.

After the death of Hanckwitz, in 1741, some experiments were made by Margraaf, Fourcroy, Vauquelin, and others; but no great improvement in the production of phosphorus appears to have been effected until 1769, when Gahn made the important discovery of phosphoric acid in bones. Margraaf had already demonstrated the individuality of this acid as early as the year 1740, and it only now remained to devise a process for extracting it. Scheele immediately did this, and various eminent chemists quickly succeeded in making various improvements in the method of working, and bequeathed unto us substantially the same process of manufacture as that now in operation.

The present sources of phosphorus are the bones of buffaloes and other animals, slaughtered in the great hunting-grounds of South America (the Pampas bordering the La Plata), where bones are used as fuel; exhausted "bone-black," or "animal charcoal" of sugar refineries; calcareous deposits of phosphate of lime, or "mineral guano" from the coast of Yucatan; and similar deposits from the Island of Sombreros; but the chief of these sources is the burnt bones from Monte Video, Rio Janeiro, Rio Grande, &c., and the animal charcoal of the sugar refineries. These various substances contain from 60 to 90 per cent. of their weight of phosphate of lime, or from 12 to 18 per cent. of phosphorus.

The phosphorus-yielding material, of whatever kind, having been suitably ground, a weighed quantity of the powder is placed in a large circular tub, lined with lead, with a mixture of oil of vitriol and water, and stirred by means of a revolving wooden stirrer, driven by a steam-engine, steam being admitted by a

pipe into the mixture to facilitate the action of the sulphuric acid upon the powder.

The changes which bone-ash or other varieties of phosphate of lime undergo in the above operation are these: the oil of vitriol or sulphuric acid gradually unites with the lime and forms sulphate of lime, and sets the phosphoric acid free; so that after the process there remains a semi-fluid mixture of a solid substance, sulphate of lime (gypsum or plaster of Paris), with a fluid body, phosphoric acid, separable by filtration.

The creamy mixture is now transferred, by means of ladles, to a filter or drainer, from which, with the aid of occasional stirring, the phosphoric acid filters into a vessel beneath. Water is added to the drained contents of the filter until the drainings cease to taste acid. The sulphate of lime or gypsum is then removed, in its damp state, to a furnace or other source of heat and dried, and constitutes a residuary product suitable for the manufacture of artificial manures.

The dilute filtered solution of phosphoric acid, containing some phosphate of lime and a small quantity of sulphate of lime dissolved in it, is transferred to leaden vessels and slowly evaporated over a gentle fire; the small quantity of gypsum then deposits itself upon the bottoms of these vessels and is removed by scraping. The liquid is deprived of as much more of its water as possible by further evaporation in similar vessels, and cooling acquires the consistence of cocoa-nut butter.

The butter-like paste is then well mixed with a due proportion of powdered charcoal, and the mixture heated in furnaces of brick or iron until it is brought into as dry a powder as can be attained. The powder consists of charcoal, phosphoric acid (a compound of phosphorus and oxygen), a little phosphate of lime, and a little water, which is chemically combined with the phosphoric acid, and not capable of removal by the means yet applied.

We have already alluded to the intense heat employed by Boyle and Hanckwitz in their distillation of phosphorus; the same is also necessary in the present mode of manufacture. The vessels in which the phosphorus is separated consist of a number (about ten) of small retorts, of a convenient shape, carefully constructed of the most refractory fire-clay, narrowed at

their mouths, and arranged nearly close together in a horizontal row in a furnace, somewhat similar to the retorts in a gas-works. They are placed in a nearly horizontal position, with their open ends slightly raised, and in a furnace so constructed as to subject them to nearly a white heat.

The black powder is introduced into the retorts when the latter are comparatively cool, and the retorts are about half filled with the mixture. Bent pipes, open at both ends, are inserted, air-tight by means of clay, into the mouths of the retorts, and their outer ends dip into warm water, in cast-iron basins, placed to receive the distilled phosphorus. I may now incidentally remark that all the manipulations with ordinary phosphorus in its simple and separated state are performed under the surface of water, otherwise it would quickly inflame and be reconverted into phosphoric acid.

The heat of the furnace is gradually raised, and in the course of some hours phosphorus begins to distil over, and accumulates in a melted state in the basins of water. The fire is still further raised, by gradual means, until a most intense heat is obtained; the phosphorus then distils rapidly. The heat, after being thus continued as long as any more phosphorus appears, is gradually decreased, and the basins containing the crude phosphorus are removed. The time occupied in the distillation is, in some cases, protracted from forty-eight to seventy-two hours.

In this operation the charcoal, at a high temperature, combines with the oxygen of the phosphoric acid, forming therewith carbonic oxide and carbonic acid gases, which escape through the nose-pipe, and the phosphorus thus set free is converted into vapor by the heat and distils over into the receiving basins. At the same time, the portion of water not extracted by the preceding process is also decomposed, and its hydrogen set free, combines with some of the phosphorus and forms, phosphuretted hydrogen gas. The inflammable gases, carbonic oxide, and phosphuretted hydrogen, are conducted away from the phosphorus basins by means of a pipe, and consumed.

When the distillation is at an end the furnace is cooled down and the residuary contents of the retorts extracted. The residue consists chiefly of charcoal (of which there is always an excess), and of undecomposed phosphate of lime, together with a

few impurities, and is used in the composition of manures, the phosphorus in it being of too difficult or too unprofitable extraction. From the penetrating and destructive character of phosphorus, the retorts require frequent renewing, some manufacturers, when the best fire-clay is not employed, not using them for more than one operation.

The appearance of a phosphorus distillery containing between 200 and 300 retorts, which we have frequently visited when in full operation, and the furnaces at their maximum heat, is somewhat fearful:—The long, yellow flames of phosphuretted hydrogen, and carbonic oxide shooting forth from the escape pipes; bits of burning phosphorus spitting forth in fiery balls from little crevices or leaks at the mouths of the retorts; the incessant bubbling of the vapor of phosphorus and escaping gases in the basins of hot water; the almost unbearable heat from the furnaces on each side, and from the red-hot flues under foot; the intolerable stench of phosphuretted hydrogen and burning phosphorus; together with the acid fumes, and filthy, grim aspect of the place, combined to produce an impression on our senses which we cannot fail to remember.

The small cakes of crude phosphorus, each weighing several pounds, are collected from the iron receiving-basins when cold, and melted together under water. The impurities which were carried over from the retorts into the basins by the current of gases and phosphorus vapor, now settle to the bottom of the fluid mass, and the supernatant phosphorus is drawn over into shallow copper pans, containing a small quantity of hot-water to prevent contact of air, by means of leaden syphons previously filled with hot water, and allowed to solidify.

The large cakes or cheeses of phosphorus thus obtained still contain impurities, and are of a dirty red color, chiefly arising from the mechanical admixture of a red variety of phosphorus in small particles. They are broken to pieces under cold water, and the fragments placed in hot water contained in a leaden vessel (heated by steam), together with a bleaching agent. The phosphorus is stirred with the heated mixture until it is bleached, or its brownish color is removed, which generally occupies two or three hours.

The liquid phosphorus is again drawn by means of syphons into

shallow copper pans, and allowed to solidify. It is then broken under water, and the pieces are placed in hot water in a double-sided (or steam-jacketed) vertical iron cylinder, lined with lead, with a perforated bottom covered with chamois leather and canvass, and while in the fluid state pressure is applied to the phosphorus, and it passes through the leather, &c., into a vessel of hot water beneath, leaving the residuary impurities, red phosphorus, &c., upon the cloth in the form of a dirty reddish substance of an earthy appearance.

The bleached and purified phosphorus is now cast into wedge-shaped pieces, or it is moulded into cylindrical sticks, half an inch in diameter, and ten inches long, by the aid of glass tubes immersed into the phosphorus under water, or by means of an apparatus with tubes specially contrived for the purpose. On some occasions the phosphorus is very brittle and difficult to draw into sticks, but if it is in a satisfactory pure state it is as ductile as lead or soft copper wire. The appearance of the purified phosphorus in the form of wedges is that of very transparent wax or glass of a slightly greenish-yellow color, but when in the form of sticks it usually appears colorless. It is needful on all occasions to protect the purified substance from strong daylight, otherwise it soon becomes yellow and opaque. For conveyance it is always packed in water, generally in tin cans, the covers of which are soldered air-tight.

The phosphorus we have described is that of the ordinary kind, but there is another variety equally pure, discovered in 1848 by Professor Schrötter, of Vienna, which is produced as follows: The ordinary phosphorus in its purified state is placed under water in a cast-iron boiler over a furnace; then melted, cooled, and the water removed from its surface. The vessel is then immediately and securely closed, air-tight (except a small iron-tube for the escape of vapor), by a cast-iron cover. The lid has a vertical iron tube, closed at its lower end, fixed in it, which projects downwards into the phosphorus, and is open at its upper end for the reception of a thermometer. Heat is now gradually applied by means of the furnace until the phosphorus is at about 450° Fah., and that temperature is maintained for a greater or less period of time, according to the amount of phosphorus operated upon, and the mass is then allowed to cool. A quan-

tity of about 200 pounds is kept heated about three or four weeks. After this process the vessel is opened, and the phosphorus, which has now become a hard, red, brick-like substance, is covered with water, and extracted by means of iron bars, &c. This process of conversion requires to be conducted with great circumspection, otherwise (from overheating of the phosphorus) fearful explosions may ensue; experience has, however, shown that they may be almost wholly avoided.

For commercial purposes the red or amorphous phosphorus, as it is termed, is required to be in a state of fine powder; the stony fragments are, therefore, broken into small pieces under water in a mortar, and ground under water between pieces of mill-stone in a vessel supplied with a small stream of water, which carries off the finer particles in its overflow stream into a large tank, where they gradually subside, or into a filter where they are collected. A process is then resorted to for the separation of any ordinary phosphorus which the powder may contain.—*Chem. News, London, July, 1861.*

(To be continued.)

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#### FORMATION OF THE GREEN MATTER OF LEAVES UNDER THE INFLUENCE OF THE ELECTRIC LIGHT.

M. Hervé Mangon has published the results of some experiments made by him, with a view of ascertaining whether the green matter of leaves, &c., would be formed when a plant was submitted solely to the influence of the electric light. It is well, known that a plant grown in darkness is devoid of green color and it is generally considered that the sun's light is essential to its development. From M. Mangon's experiments it appears that the electric light is equally capable of inducing its formation.

The electricity was produced by an electro-magnetic machine worked with a steam engine. The light was obtained from a lamp with charcoal points. The light was maintained for eleven hours on the 30th July, twelve hours on the 31st July and 1st and 2d of August, and eleven hours and a half on the 3d of August. The temperature of the air varied from 22° to 25° C., and the earth from 19° to 21° C. In the morning of the 30th

July several flower-pots, each containing four grains of rye, sown respectively on the 24th, 26th, 27th, and 28th of July, were placed in a large space perfectly secluded from external light, the pots standing about one metre from the electric lamp, and half a millimetre below the point of light. The grains sown on the 24th and 26th had sprouted, the stems being about 0.<sup>m</sup>005 to 0.<sup>m</sup>012 in length. One of these small plants presented the commencement of a green tint at the point, the others were white. By the middle of the day of the 31st the plants of the 24th and 26th had grown to 0.<sup>m</sup>01 and 0.<sup>m</sup>06 in length; they were *very green*, and strongly inclined towards the light. The plants of the 27th had sprung up and were green at the tips. By the 2d of August all the plants had developed as well as if they had been in the open air, and all exhibited their natural green color. On the 3d of August the experiment was brought to an end. It is scarcely necessary to add that some corresponding seeds grown in darkness for the same period were perfectly yellow.

It follows from the above that the electric light, like sunlight, is capable of causing the development of the green parts of plants. It has been previously shown that the light resulting from very intense combustion, such as results from pyrotechnic compositions for instance, is capable of producing the same effect.—*Lond. Pharm. Journ.*, Oct., 1861.

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#### ON TINKALZITE (BORATE OF LIME AND SODA) FROM PERU.

By T. L. PHIPSON.

Phil. Nat. Doct. Bruxelles University; Member of the Chemical Society of Paris, &c. &c.

The useful mineral of which I am about to speak was discovered only a few years ago in the deposits of nitrate of soda in Peru. It is now imported into Europe in considerable quantities as a substitute for borax. It was first examined in 1850 by M. Ulex, who found that it contained boracic acid, lime, and soda; but the analysis published by this author shows too small a quantity of water, and too much boracic acid. In 1859, M. Kletzinsky received some samples of this same mineral from the Western Coast of Africa, and the analysis he has made of them



coincides pretty well with my analysis of some specimens from Peru.

Tinkalzite is found in the layers of nitrate of soda of Southern Peru, in the shape of globular masses, which the natives call *tiza*, and which vary in size from that of a nut to that of a potato. The outer crust of these tubercles is rather hard; but they are easily broken, and are then seen to be formed, in the interior, of a mass of crystalline needles, intersecting each other in all directions, and of a brilliant white satiny appearance. Often these globular masses contain reddish crystals of gypsum and other minerals; and they always contain a certain quantity of common salt, which gives to the mineral a brackish taste.

Water extracts from tinkalzite all its chloride of sodium and borax; acids easily dissolve the whole mineral, leaving only a small residue of very fine sand.

The density of tinkalzite I find to be 1.93 (according to M. Kletzinsky, = 1.9212; and according to M. Ulex, the satin-like fibres = 1.8).

The analysis of the mineral in question has given me the following result, by the side of which I have placed the analysis of M. Kletzinsky:—

<i>American Tinkalzite.</i>		<i>African Tinkalzite.</i>	
Phipson.		Kletzinsky.	
Water.....	34.00	.....	37.40
Soda.....	11.95	.....	10.13
Lime.....	14.45	.....	14.02
Boracic Acid.....	84.71	.....	36.91
Oblorine.....	1.84	.....	1.33
Sulphuric Acid.....	1.10	.....	0.50
Silica.....	0.60	.....	"
Sand.....	2.00	.....	"
Phosphoric Acid.....	traces	.....	"
Alumina.....	"	.....	"
Magnesia.....	"	.....	"
<hr/>		<hr/>	
100.00		100.00	

The difference in the quantities of water, as shown in these two analyses, is owing to the gradual loss of water by soda-salts when exposed for some time to the air.

By neglecting the accidental elements, and calculating the

water, soda, lime, and boracic acid, we arrive at the formula—  
 $(\text{NaO}, 2\text{BoO}_3 + 10\text{HO}) + 2(\text{CaO}, \text{BoO}_3 + 2\text{Ho}) + 2\text{HO}.$

Borax.

Borate of lime. Water.

The presence of the other substances given by analysis seems to indicate that this mineral has been formerly deposited by mineral springs; and the fact that the biborate of soda it contains has crystallized with 10 equivalents of water, shows that the temperature of these springs could not have been greater than  $+55^\circ$  (Centigrade). As it is imported from America for industrial purposes, tinkalzit contains about 70 per cent. of borax, 25 per cent. of borax of lime, and  $2\frac{1}{2}$  per cent. of chloride of sodium. It forms an excellent flux for metallurgical purposes, and has been employed with success in the porcelain manufactories of Sèvres by M. Salvétat. In fact, it appears capable of effectually replacing borax in all the applications of this rather expensive salt to industrial or manufacturing processes.

To extract boracic acid from tinkalzit, a given quantity of hydrochloric acid is diluted with water, and saturated while boiling with the pulverized mineral; the clear solution is decanted while hot, and upon cooling the liquid throws down the boracic acid in large quantities.—*Lond. Pharm. Journ.*, Oct., 1861, from *Technologist*.

#### ON THE PROPERTIES OF SULPHATE OF ANILINE.

(Read before the British Association.)

DR. TURNBULL, of Liverpool, read a paper "On the Properties of Sulphate of Aniline"—a new remedy which he had used with success in the treatment of chorea, or St. Vitus's dance. He said that medical men had not acquired a knowledge of the properties of new remedies commensurate with the advances which had been made in other branches of medicine. The progress of organic chemistry had brought to light many new bodies worthy of investigation; and there could be little doubt that many of them would, if their properties were investigated, be found to prove remedies of utility. The artificial alkaloids were a numerous class, and from their resemblance in chemical constitution to the vegetable alkaloids, such as quinine, morphia, &c., it might reasonably be expected that some of them should have

powerful and useful properties. He had made some trials of more than one of them, and especially of the sulphate of the artificial alkaloid aniline, which he had administered in cases of nervous disorder. He then proceeded to give an account of six cases of chorea which he had treated successfully with this new remedy. The first was the case of a girl aged thirteen, who had involuntary twitching movements in all the limbs, and was for two months under the usual treatment, but without deriving the slightest benefit till the sulphate of aniline was given. She then recovered rapidly and got quite well. The second was a case in which the left side was chiefly affected, and the recovery was perfect in twenty-one days. The third was a case in which the twitching movements were brought on by a fright, and the recovery took place in fourteen days. The fourth and fifth were cases of recovery from the ordinary form of the disease. The sixth was a case of unusual severity, with partial loss of power of the lower limbs and inability to speak. Rapid and perfect recovery was, however, effected in this case by means of the same remedy. He adverted to two other cases in which sulphate of aniline had been used with success by other medical men; and he expressed the conviction that it would be found by the profession to be a valuable new agent in the treatment of this class of nervous diseases. In regard to the physiological action, he stated that aniline appeared to act directly on the nervous system. The most remarkable effect, however, which it produced was a transient alteration in the color of the skin and lips, which he attributed to oxidation of the aniline and the formation of a coloring matter in the blood. But this, it was observed, must be speedily eliminated from the system, as the natural color was restored as soon as the remedy was laid aside.

The President (Dr. Davy), in proposing a vote of thanks to the author of the paper, drew attention to the physiological action; and in the discussion which ensued Dr. Moffatt and other gentlemen took part.—*Lond. Pharm. Journ.*, Nov. 1861.

## ON PERCHLORIC ACID AND ITS HYDRATES.

BY PROFESSOR ROSCOE.

*(Read before the British Association.)*

All the knowledge we possess of the quantitative relations of perchloric acid is the determination of the composition of the potassium salt, first analyzed by Stadion in 1816, and afterwards by many other chemists. The perchloric anhydrous acid has not been isolated, and no analysis of the aqueous acid has ever been made. We can only account for the neglect with which chemists have treated the highest and yet the most stable of the oxides of chlorine, by the fact that the preparation of the acid in large quantities has been attended with great difficulties. The best method for preparing aqueous perchloric acid is to decompose chlorate of potassium with hydrofluosilicic acid, to boil the chloric acid thus obtained down, which splits up into lower oxides of chlorine, which escape in the gaseous state, impure perchloric acid being left behind, which is purified by distillation. The acid thus obtained is in appearance not to be distinguished from oil of vitriol, being a colorless, heavy, thick, oily, corrosive liquid, giving off by heating dense white fumes. By heating the aqueous perchloric acid with four times its volume of concentrated sulphuric acid, the latter takes water from the first, dense white fumes are evolved, a yellow mobile liquid distils over, afterwards thick oily drops appear, which, when coming in contact with the yellow liquid, form white crystals, previously obtained by Serullas, but in such small quantities that he was unable to analyze that substance, which, prepared in this way, contain always sulphuric acid, and is therefore not fit for analysis, and requires re-distillation. Heated, however, to  $110^{\circ}$  C., the crystals decompose, and split up again in the yellow liquid, which distils over at a low temperature, and the thick oily liquid remains in the retort. The yellow liquid thus obtained is pure perchloric acid, a body not known before, and can be obtained also by distilling one atom of perchlorate of potassium with four atoms of sulphuric acid. In the pure state it is perfectly colorless, but commonly slightly yellow, owing to the presence of lower oxides of chlorine. Perchloric acid is one of the most powerful oxidizing agents known; a single drop

brought into contact with charcoal, paper, wood, alcohol, &c., immediately causes explosive combustion, falling not short in violence of that of chloride of nitrogen, and brought on the skin fearful wounds are produced, which do not heal for months. Like nitric acid, it cannot be distilled without decomposition, but it darkens, and heated stronger, decomposes with explosion. It cannot be kept for any length of time; even sealed up in glass bulbs, which are placed in the dark, it decomposes suddenly after some time, smashing the vessel containing it. It mixes with water with a hissing noise and evolution of heat, uniting and forming the same crystals which were mentioned before, and was used for preparing the pure acid. Those crystals are the monohydrated perchloric acid. They melt at  $50^{\circ}$  C., and heated to  $110^{\circ}$  C., split up in pure perchloric acid, which distils over, and an oily liquid boiling at  $200^{\circ}$ , which is also obtained by boiling aqueous perchloric acid till dense white fumes are given off. That oily acid has a constant composition containing 72.8 per cent. pure perchloric acid and 27.7 per cent. of water. This percentage corresponds, however, to no definite hydrate of simple atomic composition, but follows the same general relations respecting composition and boiling point, which, as I have shown previously, hold good for so many aqueous acids, namely, that the phenomena of constant boiling point and constant composition depend chiefly upon physical, and not on chemical, attractions.—*Proceedings of the British Association, from the Manchester Guardian.*

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#### EXPERIMENTS ON THE BEST MODE OF CORRECTLY ESTIMATING THE PER CENTAGE OF ALCOHOL EXISTING IN WINES.

By JOHN HORSLEY, F.C.S. London.

Analyst to the County of Gloucester.

First, note the specific gravity of the wine to be tried, say that compared with distilled water at 1000, it is .997, or 3 short of that number; then take 5 fluid ounces of the wine and evaporate it by rapid boiling in a sufficiently capacious flask to 2 ounces; then place the flask in a pan of water for a short time

to cool. By this operation you will have expelled not only all the spirit, but a good portion of water with it.

Next make this residuary liquor containing the sugar and other extractive matter of the wine, minus its alcohol, up to the original bulk with distilled water, and take its specific gravity, which in this case will be 1.020. If this excess of 20 over the weight of the standard of distilled water be deducted from the specific gravity of the wine thus,—

.997 including its spirit, water, and other extractive matter of the grape;

20 amount of extractive matter in the water only;

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.977 will be the true specific gravity of the spirit and water contained in the wine, minus the extractive matter, which is equal to 17 per cent. of alcohol, according to the published tables of alcoholic strengths at different densities and temperatures. Or, which is nearly the same thing, we may proceed by subtracting the specific gravity of the wine, .997, from the residuary liquor, thus 1.020

997

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leaving .23, which, deducted from the standard of distilled water 1000

23

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leaves .977 as the true specific gravity of the spirit and water in the wine.

These examples may be further verified by a distillatory experiment thus:—Take 5 ounces of the wine; distil off exactly half by a gentle heat from a graduated retort to which a receiver is connected till oiliness ceases to form in the tube end of the retort, indicating that all the alcohol has passed over. The specific gravity of this distillate (consisting of spirit and water) will be .955, equal to 34 per cent., which, divided by 2,—as only half the bulk has been drawn over—gives 17 per cent. Or the distillate may be diluted with its own bulk of distilled water up to the original 5 ounces, when its specific gravity will be .977, equal to 17 per cent. of alcohol.

This per-centage may be converted into Revenue proof spirit by rule of three sum, thus:—

$$\begin{array}{rcccl} & \text{Alc.} & \text{Wat.} & \text{Alc.} & \\ \text{As } 49 & : & 51 & : & 17 = 17.69 \text{ water.} \\ & & & & 17 \text{ alcohol.} \end{array}$$

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Proof . . . 34.69

*Chem. News London, Oct. 19, 1861.*

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## ON RUBIDIUM AND CÆSIUM.

BY M. BUNSEN.

In addition to the facts which we have already published on the subject of these two metals, discovered by M. Bunsen, by means of spectrum analysis, we add the following:—

The equivalent of rubidium is 85.86 ( $H=1$ ), more than double than of potassium; metallic rubidium is even more electro-positive than potassium,—it amalgamates easily and decomposes water in the cold.

The hydrate of rubidium,  $\text{RbO.HO} + \text{Aq}$ , is soluble in all proportions in water and alcohol. When heated it fuses in its water of crystallization, becoming reduced to the state of  $\text{RbO.HO}$ , which is fusible at a higher temperature without losing weight. It acts like caustic potash, attracting water and carbonic acid from the air, and dissolves in water with disengagement of heat.

The carbonate,  $\text{RbO.CO}_2 + \text{Aq}$ , forms ill-defined crystals, of strong alkaline reaction, fusible by heat in their water of crystallization, and becoming anhydrous. This salt is fusible, deliquescent, and attracting from the air a second equivalent of carbonic acid. The aqueous solution saponifies the skin exactly like carbonate of potash.

The bicarbonate,  $\text{RbO.2CO} + \text{HO}$ , forms brilliant prisms, unalterable in the air, having a slight alkaline reaction, and a saline taste not at all caustic.

The nitrate,  $\text{RbO.NO}_3$ , does not crystallize in rhombohedral prisms like saltpetre, but in prisms with a hexagonal base, which is a second form of nitrate of potash. It dissolves in 5 parts of water at  $0^\circ \text{C}$ ., and in 2.3 parts of water at  $10^\circ \text{C}$ .

The sulphate,  $\text{RbO}.\text{SO}_3$ , is isomorphous with that of potash. At  $7^\circ \text{C}$ . it dissolves in 2.4 times its weight of water, and is, consequently, more soluble than sulphate of potash, which requires 10.4 times its weight of water to dissolve it. With sulphate of magnesia it gives a beautiful octohedral salt, and with sulphate of cobalt another double salt, in fine crystals, isomorphous with  $\text{CoO}.\text{SO}_3 + \text{KO}.\text{SO}_3 + 6\text{HO}$ .

The bisulphate of rubidium can be fused at a moderate temperature without decomposition, but at a higher temperature it is reduced to the neutral salt.

The chloride of rubidium is cubic, but crystallises with difficulty. It is fusible and volatilizable at the extremity of a platinum wire. From  $1^\circ$  to  $7^\circ \text{C}$ . it dissolves in 1.2 to 1.3 parts of water;  $\text{KCl}$  requires 3.4.

The double chloride of platinum and rubidium,  $\text{RbCl}.\text{PtCl}$  is a crystalline powder composed of microscopic octohedra. It only differs from the double chloride of platinum and potassium by its less solubility; it only dissolves, indeed, in 158 times its weight of boiling water, whereas the potassium salt only requires 19 times its weight.

Cæsium (from *cæsius*, sky-blue, on account of the color of the ray which it produces in the spectrum). The double chloride which it forms with platinum is still less soluble than that of rubidium. Its equivalent ranks by the side of those of iodine and gold, 128.4, and is consequently, one of the highest.

The hydrate of cæsium,  $\text{CsO}.\text{HO} + \text{Aq}$ , is deliquescent. When heated it loses an equivalent of water, attacks platinum, volatilizes in a spirit-flame, and easily dissolves in alcohol.

The carbonate,  $\text{CsO}.\text{CO}_2 + \text{Aq}$ , crystallizes badly; at  $19^\circ \text{C}$ . it dissolves in 9 times, and at  $78.4^\circ \text{C}$ . in 5 times its weight of absolute alcohol. It is very caustic, liquefies in the air, and is transformed into bicarbonate. It is soluble in all proportions in hot water.

The bicarbonate crystallizes in brilliant prisms.

The nitrate is anhydrous, like that of potash, with which it is isomorphous. It has the taste of saltpetre, as also has the nitrate of rubidium.

The sulphate of cæsium is also anhydrous, and crystallizes



badly. At 2° C. 1 part of this salt requires 0.63 parts of water to dissolve it. It forms double salts with the magnesian sulphates, and these double salts are isomorphous with those formed with the same sulphates and the sulphates of potash and ammonia. With sulphate of alumina the sulphate of cæsium forms a very brilliant octohedral alum.

The chloride crystallizes in cubes, but it is distinguished from those of potassium and rubidium by being deliquescent, like the chloride of lithium. It is fusible and volatile at a comparatively moderate temperature.

Cæsium is less abundant than rubidium, which, however it generally accompanies; the richest source is the mineral water of Durckheim. 10 kilogrammes of this water contain 2 milligrammes of chloride of cæsium; and it has been from the residue of the evaporation of this water that I have prepared it, by precipitating it with bichloride of platinum, and submitting the alkaline chloroplatinate to successive exhaustions with boiling water until only the chloroplatinate of cæsium was left, this, as we have seen, being the most insoluble of all, and possessing also the highest equivalent.

The lepidolites contain only traces of cæsium, but, on the contrary, they are rich in rubidium, and it is from these that M. Bunsen has prepared the latter. The lepidolite from Rosena (Moravia) contains two-thousandths of its weight of oxide of rubidium, and that from Saxony appears still richer. Probably all the saline mineral waters contain it; that of Durckheim contains two-millionths, and the mother-liquor about four hundred-thousandths of chloride of rubidium. Commercial potash, however, does not always contain it.—*Chem. News, London, Oct. 26, 1861, from Annal. der Physik und Chem.*

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#### ON THE PREPARATION OF NITRATE AND NITRITE OF ETHYL.

By M. CAREY LEA.

*Nitrate of Ethyl.*—The tendency of alcohol to decompose nitric acid is so great, that while we have any number of processes for obtaining nitrite of ethyl, Millon's is the only one known for forming the nitrate. But Millon's process fails much oftener than it succeeds (such, at least, has been my experience), in

consequence of the proportion of urea directed to be used being much too small.

Millon's process, as quoted in Kolbe's "*Organische Chemie*," directs to distill equal weights of alcohol and of colorless nitric acid, specific gravity 1.401. Not to operate upon larger quantities than 120 to 150 grammes, and to add a little urea to the above quantity, at most ("höchstens") 2 grammes of urea.

Conducted as above, the operation succeeded with me but once out of four or five times. But by using a large quantity of urea, three or four times as much, or even more, success invariably follows, and there results a great saving of urea, because when the process fails, the materials, urea included, are entirely lost, whereas when conducted as just described, very little urea is consumed. It is only necessary to add fresh acid and alcohol, after the first proportion had been distilled to about one-fifth, and the process may be repeated almost indefinitely, with the occasional addition of a little urea to keep up the proportion. The product in the second and subsequent operations is much larger than in the first.

Nor have I found it necessary to operate on the small quantities above mentioned, but have habitually used quantities amounting to 400 to 500 grammes, and should not hesitate to employ still larger ones. It is, however, more convenient to use the above quantity, and replace the material as fast as exhausted.

The facility with which nitrate of ethyl can be obtained by the above process must, I think, give it a decided advantage over the iodide of ethyl for the preparation of the ethyl bases, in the manner which I have recently described. The lower equivalent of nitric acid as compared with iodine is a matter of considerable importance; 100 parts of iodine are capable of holding in combination something less than 23 of ethyl, whereas 100 parts of nitric acid combine with over 53 of ethyl,—a material point, as the iodine on the one hand and the nitric acid on the other are merely the vehicles for bringing about the ethyl substitution. In operations in pressure-tubes, where space is valuable, this is an important consideration; in an economical point of view also the advantage appears to be greatly on the side of the nitrate of ethyl.

*Nitrite of Ethyl.*—The action of nitric acid on alcohol in the preparation of nitrite of ethyl may be conveniently moderated by protosulphate of iron, and the nitric acid reduced by that agent instead of at the expense of part of the alcohol. The proportions which I have used are, nitric acid, specific gravity 1.37, 90 cubic centimètres; alcohol, of 90 per cent., 150 cubic centimètres; ferrous sulphate, 45 grammes. The product is very large; the distillate, on being shaken up with water, yields more than half its bulk of nitrite of ethyl. The latter is not perfectly free from aldehyde, but more so than that obtained by some other processes. The action is perfectly quiet to the last, and the distillation may be carried on rapidly.—*American Journal of Science and Art*, Sept., 1861.

## ON THE MANNA OF SINAI, AND THE MANNA OF SYRIA.

By M. BERTHELOT.

‘They took their journey from Elim, and all the congregation of the children of Israel came unto the wilderness of Sin, which is between Elim and Sinai. . . . And the whole congregation of the children of Israel murmured against Moses and Aaron; and the children of Israel said unto them . . . Why have ye brought us forth into this wilderness, to kill this whole assembly with hunger? Then said the Lord unto Moses: Behold I will rain bread from heaven for you. . . . And behold upon the face of the wilderness there lay a small round thing, as small as the hoar frost on the ground. And when the children of Israel saw it, they said one to another: *Manhu*? which signifies: What is it? . . . And the house of Israel called the name thereof Manna. . . . The taste of it was like honey. . . . And the children of Israel did eat Manna forty years. . . . They did eat Manna, until they came to the borders of the land of Canaan.—*Liber Exodi*, cap. xvi.

What is the substance described in the preceding recital, which figures so much in the history of the Hebrew nation, and the name of which serves as a type of a multitude of natural sugary substances? Can it be likened to any saccharine matter known in the present day? This is a very controverted question. Two principal opinions are current on this point: the one regards manna as a sugary exudation supplied by various shrubs, principally by the *Alhagi Maurorum* (Tourn.), a kind of saintfoin; the other opinion likens the manna of the Hebrews to a species of cryptogamous plant. In these days the origin

of the manna gathered at Sinaï may be regarded as settled, according to the researches made upon the spot by MM. Ehrenberg and Hemprich. "Manna," says Ehrenberg, "is found at the present time in the mountains of Sinaï; it falls upon the earth from the regions of the air (that is to say, from the top of a shrub, and not from the heavens). The Arabs call it *Man*. The indigenous Arabs and the Greek monks collect it, and eat it with bread in the same way as honey. I have seen it fall from the tree, I have gathered it, brought it myself to Berlin with the plant and the remains of the insect." This manna flows from the *Tamarix mannifera* (Ehr.) Like a number of other mannas, it is produced under the influence of the puncture of an insect, the *Coccus maniparus* (H. and Ehr.)

If the origin of the Sianï manna be thus established, it is not so with its chemical nature. And this is a subject the more interesting, because the chemical analysis can alone explain its character as a nutritive agent. The result of my researches among sugary substances has led me to make some experiments in this respect. I have operated upon the following substances, the one identical with, the other analogous to, the manna of Sinaï:—1st. The Manna of Sinaï; 2ndly, The Manna of Syria, or rather of Kurdistan.

1st. The Manna of Sinaï.

The specimen was given to me by M. Decaisne; it was produced from the *Tamarix mannifera*; it had been gathered and brought home by M. Leclerc, who accompanied the Princes of Orleans in a voyage to the East (1859—1860).

This manna presents the appearance of a yellowish syrup, thick, and containing vegetable remains. It contains cane sugar, interverted sugar, dextrine, and water. The weight of the water was about a fifth of that of the whole mass. Its composition, after the removal of the water and vegetable remains, was as follows:—

Cane sugar, . . . . .	55
Interverted sugar (levulose and glucose), . . . . .	25
Dextrine and analogous substances, . . . . .	20
	<hr/>
	100

## 2d. Manna of Kurdistan.

The specimen was given to me by M. L. Soubeiran; it had been sent to Paris by Dr. Gaillardot. It had been gathered on the mountains of Kurdistan, to the N. E. of Mossoul. Subjoined is the information on this subject in a letter addressed to M. Gaillardot by M. Barré de Lancy, then Chancellor to the Consulate of France at Mossoul. This manna "falls without distinction on every plant in July and August, but not every year; there has been very little for the last three years. It is gathered by cutting the branches, which are left to dry for two or three days in the sun, when they are shaken, and the manna is obtained, which falls like dust. The Kurds use it without purifying it. They mix it with dough, and even with meat." The matter presents itself under the form of a pasty mass, almost solid, impregnated with vegetable matter, and especially with the leaves of the nut-gall tree. It contains cane sugar, inverted sugar, dextrine, water, and, lastly, a small quantity of green waxy matter. This is the composition of the part soluble in water:—

Cane sugar,	61.
Inverted sugar (levulose and glucose),	16.5
Dextrine and analogous substances,	22.5

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 100.0

From the preceding results, we see that the manna of Sinai and that of Kurdistan are essentially composed of cane sugar, dextrine, and the products of the alteration, without doubt, of these two principles. Their composition is almost identical, a result the more singular, because the plants which produce these two mannas belong to two extremely different species. Nevertheless, this phenomenon is not without analogy. Thus we know, that the honey gathered by bees from very different flowers possesses a composition almost identical. This is not the only comparison which may be made between honey and the manna in question. Not only do insects concur equally in the formation of honey and that of the manna of Sinai, but further, this manna, as well as honey, is composed of cane sugar and inverted sugar; the manna of Sinai contains beyond this, dextrine, and the products of its alteration.

If we return now to the historical recital of the manna of Sinai, it is easy to explain the use of this substance as a food. In short, it is a true honey, perfected by the presence of dextrine. We see, at the same time, that the manna of Sinai does not suffice as an aliment, since it does not contain any nitrogenous principle. Therefore, animal food is associated with it, as well in the actual usage of the Kurds as in the biblical narrative.—See Exodus xvi. 8—13.—*London Pharm. Journ.*, Nov., 1861, from *Comptes Rendus*.

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ON THE OLEAGINOUS MATTER FORMED ON DISSOLVING  
DIFFERENT KINDS OF IRON IN DILUTE ACIDS.

By EMERSON J. REYNOLDS.

Proust, I believe, was the first chemist who noticed that the hydrogen prepared by dissolving black cast iron in dilute sulphuric acid possessed a most offensive odor, and that on being passed through glass tubes, it caused them to assume a greasy appearance, apparently due to the deposition of an oily matter, which he appears to have considered as a combination of hydrogen and iron, the non-production of which body, under the circumstances, I will demonstrate further on.

Berzelius then afterwards noticed the formation of this oleaginous body, and gave it as his opinion that it was a compound of carbon and hydrogen. More recently, Professor Cameron in (1855) made some experiments on this oil, the results of which he communicated to the Chemical Society of Dublin. He found it to be very volatile, and destitute of nitrogen, and also that certain metallic salts removed the offensive odor produced by its presence.

But, after all, two very important points have been left undetermined, namely, the precise conditions under which this body is formed, and its chemical and physical characters and relations.

Now, it is the first of these propositions that I intend dealing with in the present paper, reserving the second for a future communication. I had contemplated waiting until my investigations were completed, before publishing the results; but in consequence of some observations made by M. Chevreul, before the

Academy of Sciences of Paris, I thought it better to bring forward what I have determined up to the present time. M. Chevreul stated that the combination of the iron with the hydrogen seemed difficult to admit, and that this consideration had led him to conjecture that the water might assist in the production of the oily matter. He, moreover, considered that the researches of M. Fremy\* on cast iron and steel, seemed to throw some light on the subject, by indicating that it is not carbon, as was represented, which yields the oily body. Now, we can clearly gather from this, that M. Chevreul points to nitrogen as being, possibly, the principal constituent of the oil, and not carbon.

In order to clear away all doubts as to its origin, it was essentially necessary to answer the three following propositions:—

1. Is the oleaginous body produced during the solution of *pure* iron in dilute acids?
2. Does iron, free from every other impurity but carbon, yield the oil when treated with acids?
3. Will iron, containing nothing but nitrogen, furnish the oily matter on similar treatment?

It will be seen at a glance, that the careful solution of these propositions would be certain to make us acquainted with the circumstances which influence its production.

The following are the methods which I adopted for answering each question:—

1. My first object was to prepare absolutely pure iron. This I procured by the process generally employed for preparing "*fer réduit*," care being taken to preclude any possible chance of impurity. The peroxide being precipitated from the pure perchloride by ammonia, after being well washed, it was then submitted to a low red heat. Moreover, the hydrogen gas used to decompose the peroxide was evolved from distilled zinc and pure sulphuric acid. The metallic iron so procured, when dissolved in dilute acid, did not yield the slightest trace of the oil. I did not come to this conclusion after one or two experiments alone, but after repeated trials. This overthrows at once the

\*See *Chemical News*, vol. iii. p. 332.

supposition that the iron combines directly with the nascent hydrogen forming the oil, and, indeed, does more, for its non-formation tends to confirm, if such were necessary, the opinion of Dr. Cameron, formerly expressed in this Journal, that such a compound as ferruretted hydrogen does not exist.

2. In answering the second question, it was essential to obtain iron containing some carbon in combination; this I prepared as follows:—Carburetted hydrogen in a pure state was passed over the iron of Experiment 1, heated to redness; the action was allowed to go on for half an hour. In this way I obtained iron containing carbon—in fact, cast iron. This compound, when dissolved in acids, gave the oil in such quantity as to allow of its being identified with the greatest ease. This experiment proves with certainty that carbon is essential to the existence of the oil, though, of course, it does not furnish us with any information as to whether the elements of water enter into its constitution or not. This can only be found by its ultimate analysis.

3. The third point to be considered in connection with this subject is, whether or not nitrogen gives rise to any oil. To determine this, another portion of the iron of Experiment 1 was submitted to the action of dry ammoniacal gas for nearly two hours and a half, by which means it became highly nitrogenised (as was proved by the abundant evolution of ammonia on heating in an atmosphere of hydrogen). This body, when treated with dilute sulphuric acid, which readily attacks it, does not, when so acted on, give the least trace of oleaginous matter. Of this I have satisfied myself; but, instead, a solution of ammoniacal sulphate is produced.

To sum up, then, my experiments show the following:—

1. Pure iron does not yield the oil.
2. Iron containing carbon does give the oil.
3. Iron containing nitrogen does not furnish the oleaginous matter.

So far for the origin of this curious body: it now remains for me to determine by analysis its composition, &c. On this subject I am actively engaged at present, and hope to turn to some account the experimental results which I have arrived at



in this paper, so as to furnish me with a means of preparing this oil in larger quantity than I have heretofore obtained it.—*Chem. News, London, July 6, 1861.*

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## ON ELECTRO-CHEMICAL COLORING AND THE DEPOSITION OF PEROXIDE OF IRON ON PLATES OF STEEL AND IRON.

By M. BECQUEREL.

Priestly was the first to obtain colored rings by means of electricity, by receiving strong charges from a battery, with a surface of about two square metres, on metal plates, by means of metallic points directed perpendicularly to their surface.

Nobili, in 1827, afterwards produced colored rings on platinum, gold, silver, and brass plates, by putting them in communication with one of the two poles of a voltaic pile, plunging them into metallic and nonmetallic solutions, and then by directing perpendicularly to their surface a platinum point connected with the other pole. With positive silver, for instance, and solution of sea salt, he obtained a series of concentric circles surrounded with irises, the tints being slightly dimmed by contact with the air. On heating the plates all the rings took a red tint.

I began to study the electro-chemical coloration of metals in 1843, my chief object being, not to produce colored rings, but to deposit on plates of gold, platinum, copper, and silver, thin and uniform layers of peroxide of lead presenting successively, according to the duration of the operation, which was generally very short, the rich colors of the spectrum. The operation consists in plunging into an alkaline solution of protoxide of lead the piece to be colored, put in connection with the positive pole of a voltaic pile charged with nitric acid and composed of many layers of plates, and closing the circle with a platinum wire in communication with the negative pole, and of which but the point, which alone touches the alkaline solution, is continually in motion. In contact with the object to be colored, the protoxide of lead, which forms the positive electrode super-oxidises, becomes insoluble in the alkali, and deposits itself on the surface in slight adherent layers, producing the color of the thin plates. Air and light gradually fade

these colors—a disadvantage I have already mentioned, and which may in great measure be avoided by covering the colored surface with alcohol varnish, which acts but very slightly on the peroxide. With a little practice all the tints desired may be given to a large object with hollows and projections, and each part painted with the appropriate color. These colors are now made fast by the processes to be described further on.

If the solution of protoxide of lead in potash is replaced by a solution of protoxide of iron in ammonia, and the gold, copper, or platinum plate by one of polished iron, there is deposited on the latter a layer of peroxide of iron with red or brown tints, which deepen more and more according to the thickness of this stratum, which never exceeds a certain limit on account of the imperfect conductivity of the peroxide.

In a paper on the precipitation of metals from their solutions by other more oxidisable metals, I stated that on plunging a copper plate into a solution of double chloride of potassium and platinum, heated to  $60^{\circ}$ , the platinum is deposited and adheres to the copper, producing a platinization, which is quickly acted on by the air, taking first a slightly brownish tint, which becomes darker and darker.

This alteration is partly due to the presence of protochloride of copper, which is deposited simultaneously with the platinum towards the end of the operation. The protochloride may be removed by washing the platinized copper with water and acetic acid, or by rubbing its surface with cotton and rouge. The alteration is then avoided, or at least does not appear till long afterwards, probably on account of the air traversing the interstices of the platinum, which with copper forms a voltaic pair. The brownish color of the platinum surface is like that which protochloride of copper ordinarily takes under exposure to air and light.

If we make use of platinized copper directly, it is obtained from a solution of double chloride as a positive electrode to decompose water with a pile composed of several elements, it produces under the influence of the oxygen disengaged from the positive pole, peculiar coloring effects, seeing that the tints pass immediately to blue and deep crimson, and the protochloride of copper

is not modified by light. While in contact with platinum the latter metal doubtless contributes to the coloration. No similar result is obtained by operating with platinized plates previously treated with acidulated water or rouge. Furthermore, air has no effect on the colors produced—not an unimportant fact, as it will make it possible to obtain fast colors also with peroxide of lead.

Owing to the strata of oxide, the result is the same, if heat is gradually applied to non-preserved platinized pieces, but the colors are less brilliant.

If a copper plate with a layer of peroxide of lead giving one of the beautiful colors of the spectrum is employed as a positive electrode to decompose the water, in a few moments it will be found that the coloration is preserved—a result similar to that obtained with platinized copper. By continuing the electro-chemical action for a quarter or half-an-hour, according to the force of the pile, the blue-violet tints fade, turning to green and yellow, as peroxide of lead. The basis of the coloration undergoes no change at the positive pole. It is thought that the acid secondary products formed at the positive pole react on the peroxide and decompose it.

The colored plates thus preserved seem to be in the same condition as iron when it has been plunged in nitric acid, or when it has been used as a positive electrode to decompose this same acid. It is then in an abnormal state, being unattackable by nitric acid.

When a very slight layer of platinum is electro-chemically deposited on a gold or platinum plate by means of a solution of double chloride of potassium and platinum containing no copper, this layer undergoes no change either by the action of the air or when the plate is employed as a positive electrode to decompose water; but it is otherwise when the solution contains copper. The coloring effects before described are then produced, when the proportion of copper is small and the coloration of the platinum is not destroyed by weak nitric acid—an important advantage practically. In this memoir we have indicated a great improvement in the process of coloration, for by its means more uniform and adherent layers of metals are deposited.

Magnificent coloring effects are produced by a solution of

double chloride of potassium and platinum in hyposulphite of soda.

Lastly, deposits of peroxide of iron on iron and steel, which are already almost unalterable by air, will become entirely so when the pieces have been employed as positive electrodes to decompose water.—*Chem. News, London, July 6, 1861, from Comptes Rendus.*

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#### ON THE PREPARATION OF UREA FROM FERROCYANID OF POTASSIUM.

In the preparation of urea by Wöhler's method the amount obtained always falls short of that which should theoretically be produced. Having remarked that even when the operation is carefully performed with Liebig's proportions, the lixiviate always contains undecomposed cyanid of potassium, it occurred to me to try the effect of a more thorough oxydation, and the result proved very favorable. The following was the course adopted.

Of roasted ferrocyanid of potassium 850 grammes are mixed with 318 grammes of thoroughly dried carbonate of potash in grains, and fused in an iron vessel. When decomposition is complete, the vessel is a little cooled and 1900 grammes of red lead are to be added, not all at once, but 300 to 400 grammes at a time, with intervals of 10 minutes, stirring and keeping up heat enough to retain the whole in a state of fusion.

After the last addition of red lead the mixture is suffered to remain half an hour on the fire to complete the reaction. Heat is applied in all for about four hours. In this way the cyanid of potassium becomes thoroughly oxydized. The process is concluded in the usual manner, and 500 grammes of urea are obtained. No particular precaution is necessary during the fusion, or even the lixiviation with cold water, but in evaporating the solutions the greatest care must be taken to carry off the vapors.—*Silliman's Journal, Sept. 1861.*

(Continued from page 568, Vol. ix.)

the other constituent which forms with oxide of lead an insoluble compound may be a copulated compound. In the examination of the fractional parts which were prepared from this precipitate according to the method described at page 373, vol. ix., attention should be directed to this point, and the method should be employed with hydrochloric acid and baryta (or soda, or potash) as described at pages 469, 561.

In the same manner as directed for the residue which is obtained from the watery decoction treated with sugar of lead, subacetate of lead, and sulphuretted hydrogen, is the residue dealt with which remains when the watery decoction was filtered through animal charcoal previous to its treatment with the lead salts, and also the residue which remains behind after the precipitation of the watery decoction with alum and ammonia, evaporating and extracting with alcohol, and distilling off the alcohol. Thus we have in these three examinations a mutual control of the correctness of the results obtained by each individual examination, and consequently a constituent can scarcely be overlooked, and also conclusions may be drawn on the nature of the individual constituents.

## II.—Examination of the cold watery infusion.

This fluid, prepared in the manner given at page 180, is divided into several parts.

The first part is introduced into a test tube, placed in a beaker glass filled with water, and the water slowly heated. By means of a thermometer inserted in the test tube, the temperature is observed. At a certain heat a coagulation of one or the other constituent is produced. When the coagulation of the substance is noticed, the lamp is removed from under the beaker glass, or the latter is taken from the sand-bath on which it has been placed to heat it. The object of this removal is to prevent the temperature of the fluid in the test tube rising any farther, and to retain it some time at the same heat, or rather to cool very slowly. The coagulum is separated after the fluid has cooled by the filtration of the fluid. To promote the filtration, it is better to take a number of small filters instead of a larger one, because the pores of the filter are quickly stopped by coagulated material of that kind, and the filtration then proceeds extremely slowly.

The filtrate is again treated as the original fluid, only the temperature is allowed in this second treatment to rise more quickly to the point where the separation takes place, and then slowly elevated. The fluid heated some degrees higher often throws off a fresh coagulum, which is likewise collected on a filter. The filtrate is again heated, to see whether by a still higher temperature a third coagulum makes its appearance. As all coagulable substances do not lose their solubility in water at the same temperature, several of these bodies may be separated from one another when they are simultaneously present in an aqueous extract.

The *second part* of the fluid is mixed with *acetic acid*, to ascertain whether a precipitate results. If a precipitate ensues, it is collected on a filter, of which several small ones are used, instead of a large one. The filtered fluid is now heated, whereby generally a coagulum is formed. The substance precipitated by a little acetic acid is examined, to learn whether it is quite or partially soluble or not in acetic acid when an excess is added. By these means a separation of several of these bodies may be sometimes effected.

The *third part* is, lastly, mixed with *alcohol*, and it is observed whether a precipitate results, which nearly in all cases makes its appearance thereby in at least a small quantity. The precipitate collected on a filter and washed with spirit, is treated with *water*, whereby only in few cases a complete solution results. The filtered aqueous solution resulting is heated, by which frequently a considerable coagulum is thrown out.

### III.—*Examination of the extract obtained by acidulated water.*

As already stated (page 181), this extract is employed for the detection of some organic acids, which *per se* are soluble in water, but are contained in the material under examination in the form of compounds, mostly as lime salts, which are neither soluble in pure water nor in spirit. It is also employed for the detection of organic bases. For example, when a part of a plant contains, as is frequently the case, oxalate of lime, the oxalic acid is neither found in the watery decoction nor in the spirituous extract, because oxalate of lime is equally insoluble in water and in spirit. By its decomposition, by means of sulphuric acid, which is added to the water, we obtained from the salt insoluble in water so much oxalic acid in a free state, that we can detect it in the fluid.

For its further investigation the acid extract is freed from its sulphuric acid by *carbonate of baryta*, which is added in small quantity. A precipitate of sulphate of baryta thereby ensues, mixed with more or less compounds of organic substances, or perhaps with precipitated organic bases, when they were present in the acid solution, and one or more of them were difficultly soluble or insoluble in water. The precipitate is collected on a filter and washed with water. The washed precipitate is *boiled with strong spirit*, and the spirituous solution is separated from the insoluble matter by a filter. It is ascertained whether the spirit has dissolved or not any organic bases. The baryta precipitate, boiled with spirit, is digested with dilute sulphuric acid, to produce sulphate of baryta, which is separated by a filter, and to obtain a solution of the substance which was combined with the baryta. The lime and baryta salts generally exhibit a very analogous degree of solubility, so that by this method mostly those compounds are obtained in solution whose lime salts being insoluble in water and spirit, could not be extracted by these fluids from the material under examination. The fluid which is filtered from the sulphate of baryta, excess of

carbonate of baryta and organic baryta compounds, and perhaps precipitated organic bases, is then mixed with *sulphate of copper*, whereby sulphate of baryta is precipitated, when a soluble baryta salt has been formed and is contained in the fluid, as well as many compounds of the oxide of copper with organic substances. The precipitate is filtered off, washed with water, and decomposed under water by sulphuretted hydrogen. The undecomposed sulphate of baryta and sulphuret of copper are filtered off, and a watery solution of the organic substances which were combined with the oxide of copper is thus obtained. The filtrate is heated, for the expulsion of the sulphuretted hydrogen, in a flask or a tubulated retort, in a water bath, during which a stream of carbonic acid is led through the liquid. After this the fluid is mixed with *subacetate of lead* as long as a precipitate ensues. By these means all the acids not precipitated by the copper salt, with few exceptions, are thrown down. The precipitate, after it has been collected on a filter and washed with water, is boiled with *alcohol*, to extract the bases possibly precipitated with the lead compounds. With these some lead salts may of course be dissolved at the same time. The spirit is distilled from the fluid, which has previously been freed from lead by sulphuretted hydrogen, and the bases are sought in the aqueous fluid filtered from the sulphuret of lead. *The fluid filtered from the precipitate produced by basic acetate of lead*, contains in the majority of cases the organic bases. The bases thus separated from most other bodies can be easily discovered therein. A portion of this fluid is employed for the detection of volatile bases, and another portion for the discovery of the bases not distillable with water, according to the directions which are given on these points in the examination of the watery decoction (pages 274, 369, 468.)

*The acid fluid* which has been obtained by the digestion of the mixture of baryta salts with dilute sulphuric acid is, by means of fractional precipitation, employed for the detection of the acids contained therein. *Acetate of baryta* is used for the fractional precipitation, which gives better results in this case than acetate of lead.

Volatile as well as non-volatile bases can indeed be separated in a shorter way from the acid extract: the former, by mixing the acid extract with an excess of a solution of potash and distillation: the latter, by infusion of galls and the like precipitants. But thereby we run in danger of overlooking some other constituents. On this account the ceremonious method of analysis here described is to be preferred.

#### IV.—Examination of the extract obtained by ammoniacal water.

This extract, as already mentioned (p. 181), is mixed with dilute hydrochloric acid, and the resulting precipitate, if any, collected on a filter, and washed with water. The precipitate is treated with hot spirit, to learn whether a portion, or the whole, of the precipitate dissolves or not in

*spirit.* Generally the greater part remains behind, which consists of albuminous bodies which are present in a coagulated condition, or, like legumine, are insoluble in a free condition in alcohol and water, but with ammonia afford compounds soluble in water. They are precipitated from their solutions by hydrochloric acid, and remain undissolved by the treatment with spirit. Among the bodies extracted by ammonia and precipitated by hydrochloric acid, and also in the part soluble in alcohol, of the mixture thus obtained, substances often exist which are extracted by alcohol from the material under examination, because they are not soluble in pure water, but are as soluble in ammoniacal water as in spirit; for example, chinovic acid, &c. We often obtain bodies of that kind purer from this ammoniacal extract than from a spirituous extract of the material, in which they are accompanied with many other substances, while in this case many of these substances are separated for the most part by the previous boiling with pure water, and thus do not interfere with their preparation in a pure state. It often happens *that substances combined with lime or magnesia are quite as insoluble in water and spirit as in ammoniacal water. When the substance combined with lime or magnesia is insoluble in acidulated water, it can only be obtained in the following way from the material:—*A portion of the material, boiled with water, is extracted with water containing hydrochloric acid, whereby the lime and magnesia compounds in question are decomposed, and the lime and magnesia dissolved as chlorides and removed. All that is soluble is separated by washing with pure water, and then the material is extracted with ammoniacal water, which now dissolves the organic body rendered free, which was insoluble as a lime or magnesia compound, and may be precipitated insoluble in water upon the addition of hydrochloric acid. *By the decoction of the material with spirit containing sulphuric acid, after it has been already exhausted with spirit, these bodies may be obtained likewise; but we are in danger, by the action of the acid in the heat, of producing changes in the bodies we desire to isolate.*

#### V.—EXAMINATION OF THE SPIRITUOUS EXTRACT OR DECOCTION.

##### *a.—Deposits from the spirituous extract or decoction.*

From the spirituous extract of the substance under examination, when the extract is prepared with hot alcohol, bodies are deposited sometimes by its cooling, or after a portion of the spirit has been distilled off, which must be subjected to a closer examination. With a cold prepared infusion, deposits of that kind make their appearance generally after the distillation of the alcohol, but mostly in smaller quantities. Resins, kinds of wax, fats, with other peculiar bodies which belong to none of these classes—as, for example, saponine—are contained in these deposits, which frequently appear of a dark green color like the spirituous extract itself, when vegetable substances containing chlorophyll have been extracted with spirit.



Probably these might be partially separated by the employment of sulphuret of carbon, and thus the analysis facilitated. Unfortunately, at present such a few data lie before us upon the applicability of this fluid, which was first employed by Lampadius for separations of that kind, that I am not in a position to give more information with regard to the employment of this body in the treatment of the mixtures in question. So much is certain, that the analysis of these mixtures belongs often to the most difficult problems. As all fats, as well as kinds of wax, dissolve at least in hot ether, but only some of the resins, it is convenient to effect a separation by ether into a soluble part, and a part insoluble therein, and to examine both after distilling off the ether more closely, supposing that the whole mass is not soluble in ether, which often happens. Some bodies in such mixtures are soluble in hot or boiling alcohol, and sparingly soluble in cold alcohol, as, for example, some kinds of wax. A partial, though not an exact separation, can be effected by dissolving the mixture in the smallest possible quantity of *boiling alcohol*, and then cooling the solution. I shall come directly to another method for the separation of this mixture into its constituents. But I must here remark that fats, when present in great quantity, as, for example, in the seeds poor in starch or in some roots, are seldom accompanied by resins in considerable quantity, and *vice versa*, leaves, woods, flowers, &c., rich in resin, contain seldom more than a trace of fat, so that we have to do either with a preponderance of fats, or a preponderance of resins, at least in the majority of cases. On the contrary, with resins, waxy substances frequently exist together. It has been already stated that vegetable bodies rich in fat are freed generally by pressure from the bulk of the fat, and the quantity of fat necessary for its investigation can be obtained almost in a pure condition. And it has likewise been mentioned before that the expressed residues, as well as such material which cannot be freed from its fat by pressure, are to be exhausted with a weaker alcohol in order to obtain alcoholic tincture as free from fixed oil as possible.

I have therefore to give the method by which a mixture of resins containing waxy bodies and a mixture of fats are to be treated, to ascertain the individual constituents of these mixtures. *The mixture of resins*, which contains admixed waxy bodies, must, before it is submitted to investigation, be subjected to some preliminary experiments, which are performed with small quantities of it. *A small portion of the resinous mixture* is treated in a mortar with water to which a little ammonia has been added, and the resinous mass is kneaded with the pestle into the closest possible contact with the alkaline fluid. Many resins possess the character of weak acids. These resins *dissolve in the ammoniacal water*, while the indifferent resins remain undissolved by this treatment. By filtration the undissolved substances are separated from the solution, and from this the dissolved resins are thrown down by dilute hydrochloric acid. By these means the

resinous mass is divided into two parts. *A second portion* of the resinous mixture is dissolved in spirit, when the method named effects no separation. But when a separation has been thereby effected, the part soluble in ammonia is dissolved in spirit. The spirituous solutions are mixed with a *solution of acetate of copper*, whereby some resins, but not all, are precipitated. *A third portion* of the resinous mixture is treated with ether, to effect, if possible, a separation. Both portions of resin which have been separated from one another by ammoniacal water are treated with ether, to produce a further separation. *A fourth greater quantity of the resinous mixture* is treated in the following manner:—The mixture is dissolved in spirit, and the solution precipitated with a *spirituous solution of acetate of lead* as long as a precipitate results. The fluid is separated from the precipitate by a filter, and this is washed on the filter with spirit. The washed precipitate is diffused in spirit, and a current of *sulphuretted hydrogen* is passed into the fluid, which is made hot by surrounding the vessel in which it is placed with hot water. After its complete decomposition, the solution is filtered hot from the sulphuret of lead in a water bath funnel. By the cooling of the filtrate the bulk of the substance separates which was previously combined with the lead. A portion often remains dissolved, which may be procured by evaporation. Frequently in this way crystalline waxy compounds are obtained by cooling separated from the resins, while sometimes one resin or the other remains dissolved in the fluid. The fluid which is filtered from the precipitate which has been produced by the spirituous solution of acetate of lead, in the spirituous solution of the resinous mixture, is treated with sulphuretted hydrogen. The lead, as well as the chlorophyll when present, are thereby precipitated from the fluid. The sulphuret of lead is separated by filtration, and the spirit of the solution by distillation, whereby the resins are precipitated. For the prevention of any alteration by heat, the distillation is undertaken in a water bath. The resins thereby obtained are treated with a *weak solution of caustic potash*, which separates the soluble from the insoluble part. The resulting solution is mixed with a watery solution of *chloride of calcium*, the resulting precipitate washed on a filter, and then dried by a gentle heat or *in vacuo*. The filtered fluid is mixed with *hydrochloric acid*, whereby a precipitate frequently makes its appearance, which is collected on a filter, washed with water, and then dissolved in *lime water*. A current of *carbonic acid gas* is conducted into the solution, by which a precipitation of organic substances often appears, which are separated from the combinations with lime by the carbonic acid. As this precipitate is contaminated with carbonate of lime, the salt is extracted with *dilute hydrochloric acid*, or the organic substances are separated from the lime salt by *alcohol*. The fluid filtered from the carbonate of lime and the organic substances is heated for the decomposition of the bicarbonate of lime present. The fluid is again filtered, and, when cold, treated with *dilute hydrochloric acid*, by which a

precipitate of organic substances results, which, as stronger acids, were not thrown down by the carbonic acid from the lime. The *lime salt*, prepared by precipitating with *chloride of calcium*, the solution which was obtained by means of potash, is, after it is dried, treated with *ether*, which generally dissolves a portion of it, which is left behind by distilling off the ether in a water bath. The portion remaining undissolved in ether is treated with *alcohol*, which sometimes likewise dissolves a small portion. Lastly, that which is insoluble in ether and alcohol, is treated with *dilute hydrochloric acid* without the application of heat, for the separation of the lime. With these individual portions we shall have the opportunity of ascertaining which method of separation possesses the advantage over the others, and to treat correspondingly the whole mass of the resinous mixture.

When we have to operate on a *mixture of fats* which has been procured either by pressure between cold or heated plates, or by the extraction of the material with hot spirit, and distilling off the spirit and filtering the watery residue through a moist filter, whereby the fat remains on the filter, we proceed in the following way:—

*A small portion of the fat is saponified with a solution of potash in a dish, the solution of soap decomposed by a sufficient quantity of dilute sulphuric acid, and the floating fatty mass separated from the watery fluid by a pipette or a small syphon; this fluid is subjected to distillation in a flask or a retort, after a refrigeratory apparatus and receiver have been connected with the distilling vessel. The distillate is tested after about two-thirds of the fluid have passed over, and the distillation is interrupted to ascertain whether it has or not an acid reaction, whether turbid or clear, whether oily globules have separated thereout, and whether it possesses an odor or not. When the distillate exhibits only a slight acid reaction, is almost odorless, quite clear, and no oily globules float on its surface, no glyceryle compounds of the volatile fatty acids are present in quantity. On the other side, they are present when the distillate has a strong acid reaction, has thrown out oily globules, or at least when these render the distillate turbid or opalescent, and has a remarkable odor. If no volatile fatty acids are present, the bulk of the fatty mixture is saponified with a solution of potash, the solution of soap mixed with common salt, and the soap formed is separated. The soap is removed after some time from the aqueous fluid, and dissolved in water with the aid of heat. The solution is again treated with common salt, and the solution and the salting repeated frequently, until the watery saline fluid takes up no more foreign substances. In the first ley, from which the soap has been separated by common salt, is contained the chief bulk of the glycerine; the soap which has been purified by repeated solution and salting, is now dissolved in water, and precipitated with a solution of sugar of lead; the precipitate which results is a mixture of lead compounds, consisting of the lead salts of the fatty acids. This mixture of lead salts, after it has been washed and dried,*

is treated with *ether*, whereby the lead compounds of the liquid fatty acids are dissolved, but not those of the solid fatty acids, and which, after being washed with ether, are decomposed, which can be accomplished either by spirit containing sulphuric or hydrochloric acid, or by treatment with spirit and sulphuretted hydrogen. The fatty acids, freed from lead, and dissolved in spirit, are, after the greatest portion of the spirit has been distilled off, mixed with a solution of carbonate of potash as long as an effervescence thereby ensues, and then the spirit is entirely expelled by evaporation. A little solution of caustic potash is now added, and the whole boiled to decompose a small quantity of the ethers of the fatty acids, which have formed by the decomposition of the lead salts with the spirit containing sulphuric or hydrochloric acid, and by the distillation of the spirit, have not quite volatilized, and to combine the fatty acids contained therein with potash. The excess of alkali is separated by salting the soap, which is then dissolved in water. *This solution of the potash salts of several fatty acids is now fractionally precipitated with acetate of magnesia, acetate of baryta, or acetate of lead*, according to the method of Heintz, by adding half of a solution of these salts, which would have sufficed to throw down the whole of the fatty acids. The precipitate is filtered off, and washed. To the filtrate, the second half of the solution of the acetate employed is added, and the precipitation is thus completed. Both precipitates are now decomposed, and both resulting portions of the fatty acids are converted into ammoniacal salts in solution, and these solutions each again divided into two parts, and precipitated by the acetate selected. This method of separation is continued until only one fatty acid is in combination with magnesia, lead, or baryta, in the individual parts. We learn whether the separation has been brought thereby to this point by decomposing a portion of a lead magnesia, or baryta salt, converting the fatty acid or acids into a silver salt, and determining the atomic weight of the acid by heat. The bulk of the lead, magnesia, or baryta salt is then decomposed, of which a small portion has been taken for the preparation of the silver salt used for the determination of the atomic weight; the resulting free acids converted into ammoniacal salts, and these fractionally precipitated. After a silver salt has been prepared from the first and second half, the atomic weights of both silver salts are determined. When the atomic weight or the organic substance of both silver salts is the same, and equal to the atomic weight of the silver salt first estimated, the separation in this examined portion has been a complete one.

If not only *glyceryle compounds* of the non-volatile fatty acids, but those of the volatile acids, are contained in the fats, the method is modified in the following way:—The saponification is performed in a still, the *solution of soap* therein mixed with a solution of *tartaric acid*, and the whole subjected to *distillation*. After the head has been fixed, and a careful arrangement made for cooling, the volatile fatty acids are then found in the *distillate*, the non-volatile ones among the contents of the still. The distil-

(To be continued.)

## Varieties.

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*On the fixed oil and Tannin in the Seeds of the Grape.* By M. R. WAGNER.—The grapes which yielded the seed were raised in a vineyard on the shores of the Rhine, in 1858. Dried at 212°, these seed contained 10·8 to 11·2 per cent. of fixed oil, and 6·5 to 7·3 per cent. of tannin. 100 parts of the stems perfectly ripe and dry, contain 6·2 to 7·3 per cent. of tannic acid.

The author proposes to utilize these seeds, by extracting the fixed oil with sulphuret of carbon, and then to employ the astringent residues for tanning and drying purposes.—*Journ. de Pharm.*, Nov. 1861.

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*Diamonds.*—In the official statistical report of the value of produce exported from Bahia, Brazil, an amount is included not exceeding 150,000*l.*, whereas an amount superior to 500,000*l.* worth of this precious stone is clandestinely sent out of the country yearly. The discovery of the diamond mines in the district of Paraguassú, in the year 1845, has effected great and beneficial results to the population and commerce. What was in that year but a desert, is now one of the most flourishing districts, inhabited by a laborious and daily-increasing population. The town of Isabel de Paraguassú and neighborhood contain 60,000 souls; that of Lencóes, 30,000; and Andarahy, 20,000—all the results of this discovery; and it may truly be said that those mines have realized for the poorer population of the interior, the same good we have observed in California and Australia. It has opened a large field to all, without dependence on professional skill or capital, of which the majority were not possessed; and in a moral sense has operated wonders in reclaiming the vicious from habits of indolence and crime. These men, finding in the extraction of diamonds an advantageous profit, naturally became large consumers of the produce of the country, which, for the want of market, was not cultivated; and altering their habits of life, increased their well-being, and eventually made them consumers of the produce of foreign countries. The town of St. Isabel de Paraguassú is now the chief depôt of the trade of the north-west of this province, and supplies all the interior populations with the comforts of European civilization, a population calculated at no less than 700,000 souls. In the neighborhood of St. Isabel the cotton plant flourishes, and nitrate of soda is found—but the great difficulty to the exportation of these valuable products is the want of a good road to this port.

Last year I used all my influence and endeavors with the late President to promote the passing of a law in the Assembly, guaranteeing five per cent. on the capital expended in the construction of a good carriage road. The law was passed and duly sanctioned by the late President, but, unfortunately, that law has been revoked. To give an idea of the importance of the road in question, it is enough to state that goods (foreign) to the value of 600,000*l.* to 1,000,000*l.* sterling are annually sent to the diamond district from this city, and that its exports in diamonds average between 600,000*l.* to 800,000*l.* per annum; no calculation being possible of the value of cotton, nitrate of soda, hides, skins, cattle, iron, &c. &c., that would be sent down, had the road I had so strongly recommended been carried into execution.—*Chem. News, London, Sept. 14, 1861, from Extract from the Report of H. B. M. Consul.*

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*Influence of Sulphur on Fermentation.*—When finely-powdered sulphur is placed in grape juice, Leuchs says the fermentation goes on as usual with the formation at the same time of a good deal of sulphuretted hydrogen. If the must is not too much diluted with water, there is a smell, and even taste resembling that of garlic or onions, but when diluted, the smell is more like that of liver of sulphur. The sugar appears to be decomposed but slowly, for the fluid remains sweet a long time. Leuchs suggests that mineral waters, containing sulphuretted hydrogen and carbonic acid, may be prepared by fermenting with a little sulphur. Grapes which have been dusted over with sulphur to cure the disease, the author says, give wine that smells of sulphur, but loses the smell in six months, in consequence of the oxidation of the sulphur. Powdered sulphur added to a solution of grape sugar excited no fermentation in the first eight days. Afterwards the fluid became cloudy, and sulphuretted hydrogen was evolved. The fluid passed through filtering paper with great difficulty, and gum appeared to have been formed.

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*Colorless Caoutchouc Varnish.*—Dr. Bolley recommends to cut the caoutchouc into small strips, and digest them in benzine, at the ordinary temperature; stirring or shaking the mixture frequently and long. The jelly which forms is partly dissolved, and gives a liquid heavier than benzine, which may be made nearly colorless by filtration and repose. By pressing the residuum in a strong cloth, may be obtained a dark colored insoluble jelly, which makes a good adhesive covering. It incorporates well with all the fat and volatile oils, and dries rapidly: the surface is not shining. It is very flexible, and may be spread in thin coats.—*Dingler's Polytech. Jour. Bull. Soc. d'Encour pour l'Indus. Nat.*

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*The Working power of Coal.*—Professor Rogers estimates that nearly one-sixth of the total annual produce of our coal mines is used for the pro-

duction of mechanical power alone, from which a power equal to that of 66,000,000 able bodied men is obtained. Each acre of a seam yielding three feet of pure fuel, is equal to about 5000 tons, and possesses a reserve of mechanical strength equal to the labor of 1600 men during their whole life; and each square mile of the same bed contains 8,000,000 tons of fuel which is equal to 1,000,000 men laboring through twenty years of their ripe strength. Upon the same calculation, the total annual coal production of the United Kingdom (65,000,000 tons) is equal to the strength of 400,000,000, strong men, or more than double the number of adult males now upon the globe.—*Lond. Mech. Mag., Sept. 1861.*

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*India-Rubber Stoppers for Bottles.* Messrs. Editors,—Will you allow me to call the attention of the profession, through your pages, to a recent invention which promises to be of great convenience to physicians, as well as to all other classes of the community. I refer to the India-rubber corks for bottles and vials. By means of this admirable substitute for the common cork, bottles containing the strongest acids may be carried without danger in the pocket, and the great inconvenience and expense of ground-glass stoppers obviated. The vulcanized rubber of which they are made will resist, I believe, all chemical agents. I have kept a bottle of concentrated sulphuric ether, closed with one of these stoppers inverted for several days, without the slightest visible effect being produced on the gum.

For alcohol, solutions of nitrate of silver, tincture of iodine, the various mineral acids, and indeed, for all liquids, the India-rubber stopper is more than a convenience, it is a positive luxury, as, I am confident, all will agree who have tried it. To practitioners in the country, who carry their own medicines with them, it will be of inestimable advantage. In the sick room, also, the new stopper is of very great utility. By means of it, bottles containing effervescing fluids, such as champagne, citrate of magnesia, soda-water, &c., can be tightly corked again after having been opened, so that small quantities of their contents may be used at a time without the slightest detriment to the remainder. Lastly, and not least, these corks are sold at a price which will place them within the reach of all. M.—*Boston Med. and Surg. Journ., Dec. 12, 1861.*

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*Reputed Specific for Small-pox*—At the last meeting of the Epidemiological Society, a communication was read from Mr. Herbert Miles, Assistant-Surgeon to the Royal Artillery, respecting a plant that was stated to be a specific for small-pox. The remedy is given in the form of a strong infusion of the rhizome, and Mr. Miles had, after very considerable difficulty, succeeded in obtaining a small supply of the plant, which he had forwarded to the Society.

Mr. Miles is quartered in Canada, where an epidemic of small-pox having broken out among the Indians, the disease had proved virulent in the ex-

treme among the unprotected, because unvaccinated, natives. However, the alarm had greatly diminished on an old squaw going amongst them, and treating the cases with the infusion. This treatment, it is said, was so successful, as to cure every case. The Secretary of the Society, Dr. McWilliam, C. B., had sent specimens of the plant to Dr. Hooker, of Kew, who pronounced it to be the *Sarracenia purpurea*, one of the pitcher plants of North America.

Mr. Marson, of the Small-Pox Hospital, has kindly undertaken to give the so-called remedy a trial.—*London Pharm. Jour.*, December, 1861.

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*Carbonized Rye as a Tooth Powder.*—Rye charcoal is said to be much used in Paris as a tooth powder. The following constituents have been found by Schrader in 500 grammes of the ashes of rye: Carbonate of lime, 7 grammes; 9.8 ditto of carbonate of magnesia; 7.2 ditto of oxides of iron and manganese, and 1.9 ditto of silica.—*Ibid.*

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*The Action of Porous Bodies in Inducing Chemical Combinations.*—M. B. Corenwinder showed some years ago that partial combination of sulphur and hydrogen may be effected by bringing the two bodies together in the presence of pumice-stone at a red heat. He has recently shown that the vapor of water may be also decomposed by sulphur, when some porous body at an elevated temperature is made to intervene. The experiment was conducted as follows:—Some fragments of recently calcined pumice stone were placed in the middle part of a glass or porcelain tube; one end of the tube was then filled with pieces of sulphur, a plugget of asbestos being placed between the cork and the sulphur. A tube, by which steam could be sent in, passed through the cork. The pumice-stone was then heated to redness, and the sulphur made to slowly volatilize. At the same time a current of steam was cautiously sent through. After a little time, sulphuretted hydrogen was produced in abundance. A still more decided result is obtained if pure calcined silica be substituted for the pumice-stone. The porous body is totally unacted upon in all cases.

The author directs the attention of geologists to these results; he thinks that they may explain the presence of sulphuretted hydrogen in certain volcanic emanations.—*Ibid.*

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*Formation of Fatty Matter in Olives.*—The cause of the formation of the different fatty and other principles which exist in plants is at once a most interesting problem to be solved, and one upon which but little light has hitherto been thrown. M. de Luca has endeavored to solve it with regard to the oily principle of olives, but he has only succeeded in establishing certain relations between the density of this fruit and its richness in oil.



Thus he found that in perfectly ripe olives the density had obtained its minimum, and the oil its maximum, a result which it was easy to foresee. M. de Luca has found *mannite*, not only in the olives themselves, but also in the different organs of the olive plant, and particularly in the leaves. This saccharine matter is easily extracted by the employment of boiling alcohol, which deposits upon cooling. It appears to be connected with the production of the fatty matter.—*Ibid*, from *L' Union Pharmaceutique*.

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## Editorial Department.

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OUR JOURNAL.—The Thirty-fourth Volume, the 10th of the Third Series, begins with this number, and it is the wish of the Publishing Committee to continue the work uninterruptedly, notwithstanding the depressed condition of business, and the large falling off of subscribers consequent upon our national difficulties. Will our friends who are in arrears enable us to do so by giving their attention to their dues? We hope they will cheerfully do so, and save us from the necessity of diminishing the size of our volume.

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THE AMERICAN PHARMACEUTICAL ASSOCIATION.—It is time that the members of the Association should consider the subject of the next meeting, as to when and where. At the present moment, the prospect for a full meeting is exceedingly unfavorable; but will it not be better to have a meeting, even though it be small, rather than let another year pass without leaving a record of our progress? It may be premature to offer a decided opinion at this time, in view of the unsettled state of public affairs, but we feel willing to suggest—1st, that it will be impolitic to meet west of the Alleghanies; and 2d, that Philadelphia will, under all the circumstances, be the most appropriate place; and 3d, that the time proposed for the St. Louis meeting will be more suitable to the convenience of those at a distance than later. Let the members then look forward to a meeting in 1862, and gather together observations and results that will give interest to the occasion, and if they cannot come, let them send their papers to the meeting by those who can come.

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MILITARY PHARMACEUTISTS.—Occasionally, for many years past, apothecaries have been employed on some of our naval vessels to facilitate the duties of the surgeon; but from the fact that no rank attaches to the

position, we are told, it is but little sought after, as the "Surgeon's mate" is socially ill situated on ship-board. We are not aware that the apothecary has heretofore been employed in the medical department of the "regular" army of the United States. The immense extension of this service at the present time has caused in many of the volunteer regiments the employment of apothecaries, especially in the regimental hospitals. The vital importance of an efficient and intelligent service in dispensing aid and medicines both on the battle field and in the general and camp hospitals is so self-evident, that it will undoubtedly claim the attention of the proper authorities. To make this service more effective, it should be separated sufficiently from that of the surgeon to give a distinct standing and rank to the pharmacist, as in the French army, with clearly defined duties, that his proper self-respect, and ambition to be eminent in his sphere, may have ample room for display. Unless such an arrangement can be made, it is not probable that the better class of graduates in Pharmacy would seek positions of this kind.

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**MEDICAL AND OTHER EXCHANGES.**—From the numerous suspensions of medical journals, our exchange list has been considerably decreased, and as we have not received "The Druggist" lately, we fear it has had to succumb to the times. Whilst on this subject, we will remind the editor of the "Chemical News," London, that we have never received a single copy of his journal in exchange, as agreed to, although we have provided an agency in London to receive it. Meanwhile our journal has been regularly sent to him through Bailliere, Bros. & Co. Will he send the numbers for the year 1861 to the address on the fourth page of our cover, or does he decline the exchange?

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*The Physician's Visiting List, Diary, and Book of Engagements for 1862,*  
Philad. Lindsay & Blakiston.

This excellent little annual was placed on our table some months ago, and by accident was overlooked. It is cheerfully recommended as a valuable aid to the practitioner in helping the memory in the daily routine of practice.

## CATALOGUE OF THE CLASS OF THE PHILADELPHIA COLLEGE OF PHARMACY.

FOR THE FORTY-FIRST SESSION, 1861—62.

*With a List of their Preceptors and Localities.*

Matriculants.	Town or County.	State.	Preceptors.
Abel, Jacob W.	Philadelphia,	Pennsylvania.	John Moffet.
Adams, J. Montreville		New Jersey.	Thomas Weaver.
Allen, Wm. M.	Philadelphia,	Pennsylvania.	Jenks & Middleton.
Bachmann, Adolphus	"	"	Adam H. Wilson.
Berger, Christian	"	"	Charles Ellis & Co.
Blithe, Henry	Montgomery,	"	Gaillard & Marshall.
Brown, Albert P.	Philadelphia,	"	m. B. Webb.
Bourke, Joseph M.	"	"	John Gegan, M. D.
Buchanan, W. G.	"	"	Samuel Gerhard.
Buehler, Edward H.	Harrisburg,	"	Wyeth & Bro.
Caspar, Thos. J., M.D.	Philadelphia,	"	
Chipman, Ed. D.	Frankford,	"	J. T. Farr.
Clark, Edward B.	Portsmouth,	Ohio.	John C. Baker & Co.
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Collom, Charles D.	"	"	Wetherill & Bro.
Combs, Matthew	"	"	Matthew Combs.
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Dickson, Robert W.	"	"	F. Brown.
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Dobbins, Edward T.	Philadelphia,	Pennsylvania.	Wyeth & Bro.
Eldridge, Geo. W.		New Jersey.	Geo. J. Sottergood.
Fetter, Marcus C.	Bethlehem,	Pennsylvania.	C. H. Eggert.
Fox, Daniel S.	Reading,	"	H. A. Bower.
Fugate, E. L.	Philadelphia,	"	Aea Jones.
Givens, John	"	"	Wm. M. Reilly, M. D.
Greiner, A. Welden	"	"	Wm. Evans, Jr.
Gristock, Charles F.	"	"	C. Fronefield.
Hance, John C.	"	"	R. A. Hance.
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Hansel, George	Rancocas,	"	Richards & Co.
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Israel, Julius		Germany.	G. Mannel
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Knorr, Andrew K.	Philadelphia,	Pennsylvania.	A. K. Knorr.
Kunkel, S. A.	Middletown,	"	Wm. Hodgson, Jr.
Lehlbach, P. Fred'k	Newark,	New Jersey.	Wm. Wider.
Leslie, Henry W.	Bristol,	Pennsylvania.	H. W. Leslie.
Lobb, Henry W.			J. G. Kline.

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Morell, Elijah S.	"	"	Charles Morell.
Mullen, Wesley W.	"	"	Charles Ellis & Co.
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Notson, G. W.	"	"	Wm. M. Notson, M. D.
O'Reilly, Robert	"	"	Charles Ellis & Co.
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Perkins, John S.	"	"	Peter Niskey.
Preston, David	Harford Co.	Maryland.	Wm. Procter, Jr.
Reeder, W. D.	Philadelphia,	Pennsylvania.	Wm. B. Hartman.
Rex, Thomas A.	"	"	E. Parrish.
Rohrer, Earl Penn	"	"	Thomas Estlack, Jr.
Romberg, W. Fred.		Germany.	Wm. Macpherson.
Ruan, James	Philadelphia,	Pennsylvania.	G. M. Snowdon.
Schmidt, Christian	Baltimore,	Maryland.	Theo. Brandes, M. D.
St. Clair, Theo. A.	Philadelphia,	Pennsylvania.	A. B. Taylor.
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Sellers, Charles P.	"	"	H. F. Sellers, M. D.
Senneff, Jacob	"	"	S. Warner.
Shallcross, Aaron P.		Ohio.	E. Parrish.
Shoemaker, R. M.	Philadelphia,	Pennsylvania.	Thomas P. James.
Smedley, Bennett L.	Delaware Co.	"	A. H. Yarnall.
Smyser, George M.	York,	"	Wm. Procter, Jr.
Snyder, J. B.	Marietta,	Ohio.	J. B. McClean, M. D.
Sterne, W. Henry	Philadelphia,	"	A. F. Hazard & Co.
Stevenson, Howard A.	"	"	Ziegler & Smith.
Tait, Stewart	"	"	Roger Keys.
Thomas, Chester S.	"	"	Hughes & Coombe.
Thomas, Edwin	Quakertown,	"	J. T. Shinn.
Thomas, Jason P.	Tamaqua,	"	Henry C. Blair.
Tredenick, J. B.	Columbia,	"	House of Industry.
Tobias, Snyder		"	L. R. Nordman.
Tomlinson, Edwin	Haddonfield,	New Jersey.	Henry C. Blair.
Wells, Clayton N.	Rancocas,	"	Charles Ellis & Co.
Witmer, D. L.	Philadelphia,	Pennsylvania.	A. H. Yarnall.
Zacharias, S. M.	Mechanicsburg,	"	Beates & Miller.

# THE AMERICAN JOURNAL OF PHARMACY.

MARCH, 1862.

RESEARCHES ON THE MOLECULAR DISSYMMETRY OF NATURAL ORGANIC PRODUCTS. By L. PASTEUR, Member of the Chemical Society of Paris. Presented to the Chemical Society of Paris, January 20 and February 3, 1860. Translated from "*Leçons de Chimie professées en 1860.*" By W. S. W. RUSCHENBERGER, M. D., U. S. Navy.\*

## SECOND LECTURE.

If we consider material objects, whatever they may be, in the relation of their forms and of the repetition of their identical parts, we shall not be slow to perceive that they are distributed in two great classes, thus characterized: Some placed before a mirror give an image which to them is superposable; the image of others would not cover them although it faithfully reproduces all their details. A straight stair, a stem of distich leaves, a cube, the human body, are bodies in the first category. A winding stair, a stem of leaves spirally inserted, a screw, a hand, an irregular tetrahedron, are so many forms of the second group. These latter have no plane of symmetry.

We know on the other hand that compound bodies are aggregates of identical molecules, themselves formed of assemblages of elementary atoms distributed according to laws which regulate the nature, the proportion, the arrangement of them. The individual, for every compound body, is its chemical molecule, and this is a group of atoms, not a group pell-mell; there is, on the contrary, a very determinate arrangement. Such is the manner in which all physicists represent the constitution of bodies.

This stated, it would have been very astonishing had not nature, so varied in her effects, and whose laws permit the existence of so many species of bodies, offered in the atomic groups of

\* Continued from page 16.

compound molecules both of these two categories in which all material objects are distributed. In other words, it would have been very extraordinary, if among all chemical substances, natural or artificial, there had not been individuals with a superposable image and others with an image non-superposable.

Things happen in fact as might be naturally anticipated ; all chemical combinations, without exception, are equally distributed in two classes ; those having an image superposable, and those having an image not superposable.

## II.

It is easy to show that this is a legitimate consequence, necessary from our first comparison. To place it in clear light I will briefly recall the principal conditions of the decisive experiment which closed the preceding lecture.

I prepare by the aid of natural paratartaric acid, the paratartrate of soda and ammonia. It is deposited in beautiful crystals.

Observed in a polarizing apparatus, a solution of any portion of this double salt offers no indication of optical deviation ; and in separating from the crystals the acid which they contain, paratartaric acid, identical with that which served to form them, is reproduced. So far all is simple and natural, and it seems as if we had to deal with the crystallization of an ordinary salt. There is nothing of the kind, however.

Take another portion of the same crystals and examine them one by one. You will find that one half has the form, a model of which I here present, characterized by a non-superposable hemihedrity ; that the other half has the inverse form identical with the first in all its respective parts, and yet cannot be superposed on it. Then let the two kinds of crystals be isolated to be dissolved separately, and we observe that one of the two solutions deviates the polarized light to the left and the other to the right, and both equally.

If we extract by the ordinary chemical processes the acids from these two kinds of crystals, we perceive that one of them is identical with common tartaric acid, and that the other is in all points similar, except that it cannot be superposed on it. They bear to each other the relations of the two salts from which they

were separated. They resemble each other as much as the right hand resembles the left, or as two irregular symmetric tetrahedrons resemble each other, and these analogies and these differences are found in all their derivatives. What can be done with one may be repeated with the other under the same conditions, and the resulting products constantly manifest the same properties, with this single difference, that in some the deviation of the plane of polarization is to the right, and in others to the left, and that the forms of corresponding species, although identical in all their details, cannot be superposed.

All these facts, so clear, so demonstrative, oblige us to refer the general exterior characters of these acids and their combinations, to their individual chemical molecules. Not to do it would be to ignore the rules of the most common logic. It is thus we arrive at the following conclusions :

1st. The molecule of tartaric acid, whatever it may be otherwise, is dissymmetric, and of a dissymmetry with an image non-superposable. 2d. The molecule of the left tartaric acid is formed precisely by the group of inverse atoms. And by what characters shall we recognize the existence of molecular dissymmetry? In the one case by non-superposable hemihedrity; in the other, and especially by the rotary optical property when the body is in solution.

These principles being stated, let us examine all bodies, whether from nature or the laboratory, and we shall find easily that among them a great number possess both this kind of hemihedrity and the molecular rotary property, and that all others possess neither the one nor the other of these characters.

I was right, then, in saying: The legitimate and forced consequence of our first lecture may be thus expressed:—

All bodies (I use this expression chemically) are divided into two great classes; bodies with a superposable image, and bodies with a non-superposable image; bodies constructed of dissymmetric atoms, and those formed of homohedric atoms.

### III.

Here we encounter a fact worthy of fixing the attention, even though we should regard it alone and isolated from the whole of the considerations about to follow. It is this:

All artificial products of the laboratory and all mineral species have a superposable image. On the contrary, most of the natural organic products, (I might say all, if I had to name only those which play an essential part in the phenomena of animal and vegetable life,) all products essential to life are dissymmetric and of the dissymmetry which causes their image to be non-superposable.

Before proceeding further, I desire to set aside some objections which cannot fail to present themselves to your minds.

#### IV.

Quartz, you will say at once? We have seen in the last lecture that quartz possesses the two characters of dissymmetry, the hemihedrité in form observed by Haüy, and the rotary phenomenon discovered by Arago. Nevertheless, all molecular dissymmetry is absent in quartz. To understand it, let us advance a little further in the knowledge of the phenomena we are considering. We shall find, moreover, the explanation of the analogies and differences already previously indicated between quartz and natural organic products.

Permit me to describe roughly, though in the main accurately, the structure of quartz and that of natural organic products. Imagine a winding stair, the steps of which shall be cubes, or any other object with a superposable image. Destroy the stair, and the dissymmetry will have disappeared. The dissymmetry of the stair was the result only of the mode of putting together its elementary steps. Such is quartz. The crystal of quartz is the stair all built. It is hemihedric. For this reason it acts on polarized light. But let the crystal be dissolved, melted, its physical structure destroyed in any manner, and its dissymmetry is suppressed, and with it all action on polarized light, as would happen, for example, in a solution of alum, a liquid formed of molecules of a cubic structure distributed without order.

Imagine, on the contrary, the same winding stair formed of irregular tetrahedrons for steps. Destroy the stair, and the dissymmetry will still exist, because you have to deal with an assemblage of tetrahedrons. They may be in any position, but each one of them will have its proper dissymmetry, nevertheless. Such are organic bodies in which all the molecules have



a proper dissymmetry, which is translated in the form of the crystal. When the crystal is destroyed by solution, there results from it a liquid active for polarized light, because it is formed of molecules pell-mell, it is true, but each having a dissymmetry in the same direction, if not of the same intensity in all directions.

## V.

Quartz, then, is not molecularly dissymmetric, and up to the present time we do not know any example of a mineral which possesses molecular dissymmetry. I have said that we must extend this proposition to the artificial compounds of laboratories. Here still we may have some scruples. We may object, for example, that native camphor, which is dissymmetric, yields artificially camphoric acid, also dissymmetric; that aspartic acid derived from asparagine by a reaction in the laboratory is dissymmetric like asparagine, and I might cite many other like examples. But no one doubts that camphoric and aspartic acids owe to camphor and to asparagine their proper dissymmetry. This exists in the mother products, and it is transferred, modified more or less by substitution, from the mother products to their derivatives. We are unable to produce better evidence, in general, of the preservation of the primitive type in a series of products connected by a common origin, than the permanence of the optic property.

When I affirm that no artificial substance has yet presented molecular dissymmetry, I mean to speak of artificial substances, properly so called, formed entirely of mineral elements or derived from non-dissymmetric bodies. For example: Alcohol is not dissymmetric. Its molecule, if we could isolate and study it, placed before a mirror, would present an image superposable to it. Now, there is no derivative from alcohol which is not dissymmetric. I could multiply examples of this kind without end. Further, take any dissymmetric body, and if you subject it to somewhat energetic chemical reactions, you will assuredly see the dissymmetry of the primitive group disappear. Thus, tartaric acid is dissymmetric. Pyrotartaric acid is no longer so. Malic acid is dissymmetric. Malsic and paramalsic acids of M. Pelouze are not. Gum is dissymmetric, mucic acid is not.

Artificial products, then, have no molecular dissymmetry; I do not know how to indicate the existence of a more perfect separation between the products originating under the influence of life and all others. We insist a little, because you will see in the sequel of this lecture the physiological aspect of these studies disengages itself more and more. Let us pass in review the principal classes of natural organic products:

Cellulose, feculæ, gums, sugars; tartaric, malic, quinic, tannic acids; morphia, codeia, quinia, strychnia, brucia; essences of turpentine, of lemon; albumen, fibrin, gelatin. All these immediate principles are molecularly dissymmetric. All these substances have the rotary power when in solution; a character necessary and sufficient to establish their dissymmetry, even when, in the absence of possible crystallization, hemihedritry would be wanting for the recognition of this property.

All the substances most essential to the vegetable and animal organism figure in this enumeration.

There are many natural substances which are not dissymmetric. But are they natural in the same sense as the others? Do we not necessarily see in such bodies as oxalic acid, hydruret of salicylic acid, fumaric acid, the derivatives of natural substances properly so called, formed by actions analogous to those of the laboratory? These products seem to me to be in the vegetable organism what urea, uric acid, creatin, glycolic acid, are in the animal organism, rather excretions than secretions, if I may so speak. It will be very interesting to follow this point of view experimentally.

We may add to this, that many bodies, non-dissymmetric in appearance, may be *paratartaric*. A word is wanting in chemical language to express the fact of a double molecular dissymmetry concealed by the neutralization of two inverse dissymmetries, the physical and geometric effects of which rigorously compensate each other.

The double proposition, to which we have just been led, upon the habitual dissymmetry of immediate organic principles, and upon the absence of this character in all the products of inorganic nature, enables us to enlarge and render more and more precise our manner of viewing the subject of this remarkable molecular property.

## VI.

In 1850, M. Dessaignes, whose ingenious skill is known to chemists, announced to the Academy that he had succeeded in transforming the bimalate of ammonia into aspartic acid. It was a step which tended to confirm the important results that M. Piria had obtained some years previously. M. Piria had succeeded in transforming asparagine and aspartic acid into malic acid. M. Dessaignes, in his turn, showed inversely that malic acid could be re-formed into aspartic acid.

Thus far there was nothing but what was very natural in the observation of M. Dessaignes, even in the optical point of view. For my part, I had recognised that asparagine, aspartic acid, and malic acid, were active on polarized light. The chemical passage of one of these bodies to the others was not surprising.

Some months later M. Dessaignes made another step forward. He announced that not only the bimalate of ammonia, but also the fumarate and maleate of ammonia had equally the property of being transformed by heat into aspartic acid.

Here I perceived an impossibility; or, if the thing was as M. Dessaignes asserted, this skilful chemist had made a discovery which he did not suspect. Indeed, I observed that fumaric and malic acids, and all their salts, were without action on polarized light. If, then, M. Dessaignes had succeeded in transforming their salts of ammonia into aspartic acid, he must have realized, for the first time, the production of a dissymmetric body by the aid of compounds which are not.

But it appeared to me more reasonable to believe that the aspartic acid of M. Dessaignes differed from natural aspartic acid decidedly in the absence of the molecular rotary property. M. Dessaignes, it is true, had carefully compared the properties of the artificial acid with those of the natural acid, and, as he said, found them identical. Better than any one, from the example of M. Mitscherlich, of whom I spoke at our last meeting, I knew how delicate is the determination of the identity of chemical species, in studies in which the greatest similitude of properties often conceal profound differences. I did not hesitate to believe, therefore, that the new fact announced by M. Dessaignes had need of confirmation.

I attached so much importance to the elucidation of this

question, and in the anticipation even of the results which I am about to have the honor to lay before you, that I immediately made a journey to Vendome, where I submitted my doubts to M. Dessaignes, who at once presented me with a specimen of his aspartic acid. On my return to Paris, I found immediately, in fact, that the acid of M. Dessaignes was only an isomeric of the natural aspartic acid, that is, the acid derived from asparagine, and that it differed from it, as I had foreseen, by the rotary property, entirely absent in the artificial acid, not at all doubtful in the natural acid. But all the other physical and chemical properties possessed the greatest analogies, so great that M. Dessaignes, who was not put on his guard by any pre-conceived idea, had concluded that the two substances are really identical.

What attracted me most in the examination of the new compound, (which by itself offers no very remarkable crystallizable combinations,) was its transformation into malic acid. It is indeed known that M. Piria, just mentioned, long ago gave the means of obtaining malic acid from asparagine and aspartic acid; and I was assured by the most exact proofs that this malic acid was identical with that of the service, [*sorbus*,] the apple, the grape, and tobacco.

I then treated the new acid in the manner discovered by M. Piria, and transformed it into a new malic acid very similar to the natural acid, so close to the latter, that a chemist would have great difficulty in distinguishing them, even if warned of their real dissimilarity; only this malic acid had no action on polarized light, and it was the same with all its saline combinations.

There are certain derivations of these two malic acids, the comparison of which does not very clearly manifest the true mutual dependence of the molecular arrangements of these curious isomerics, but there are others in which it is plainly seen. Let us consider, for example, the ordinary active bimalate of lime, and the corresponding inactive bimalate. Their chemical composition is exactly the same, and their crystalline forms are alike, with this difference that the form of the active bears four small hemihedric faces, always absent in the form of the inactive. Whence it results that placed before a glass, the image of the active cannot be superposed on it, while the image of the inactive is absolutely identical and superposable to the reality which gives

it. Excepting the hemihedric faces, there is a perfect resemblance between the two forms.

Who could doubt after that, the relations of molecular arrangements of these two salts? Is it not evident that we have here to deal with a malic acid identical to the natural, except the simple suppression of its molecular dissymmetry?

This is the natural malic acid untwisted, if I may so express it. The natural acid, in the arrangement of its atoms, is a winding stair; this one is the same stair, formed of the same steps, but straight, instead of being spiral.

It might now be asked if the new malic acid is not the paratartaric of the series, that is, the combination of the right malic acid with the left malic acid. That is scarcely probable; for then not only with an inactive body we would have made an active body, but would have made two, one right and one left.

Besides, I have ascertained that just as there exists a non-dissymmetric inactive malic acid, so there is also a non-dissymmetric inactive tartaric acid, very different from paratartaric acid, and which cannot be resolved into right tartaric and into left tartaric acids. Here it cannot be doubted that we have to deal with right or left tartaric acid rendered non-dissymmetric.

I have also discovered inactive amylic alcohol, which yields a whole series of inactive products corresponding to the series of active amylic alcohol.

Thanks to the discovery of inactive bodies, we are in possession of a fruitful idea: a substance is dissymmetric, right or left, by certain modes of isomeric transformations, which must be sought and discovered in each particular case; it may lose its molecular dissymmetry, untwist itself, to use a coarse illustration, and effect in the arrangement of its atoms a disposition with a superposable image. So that every dissymmetric substance offers four varieties, or rather four distinct subspecies: the right body, the left body, the combination of the right and the left, and the body which is neither right nor left, nor formed by the combination of the right and left.

## VII.

This general conclusion from the preceding studies, throws new light upon our ideas of molecular mechanism. We see that

if natural products, organized under the influence of vegetable life, are ordinarily dissymmetric, contrarily to what mineral and artificial products offer us, this disposition of elementary particles is not a condition of existence of the molecule, that the twisted organic group can untwist itself, and then take the general character of artificial or mineral substances. On the other hand, it seems to me logical to regard the latter as susceptible of presenting a dissymmetric arrangement of their atoms in the manner of natural products. The conditions of their production are to be discovered.

As final analysis and summing up of what precedes, the groups of elementary atoms which constitute compound matter may cover two distinct states, corresponding to two general types to which every material object may be referred. The form of the group is with a superposable image, or with a non-superposable image; but this latter type is double, because its inverse can exist on the same ground as itself. We must add the case of the association of these two inverse types, which recalls the union by pairs of the identical and non-superposable members of the superior animals. So that there is in reality four remarkable dispositions for the groups of atoms which constitute matter. All our efforts should tend towards producing them for each particular species.

There is in almost all these considerations such exactitude, that it seems impossible to call them in question.

How refuse to admit that a right body has its possible left, knowing as we know the signification of the right or left character? This would be to doubt that an irregular tetrahedron has its inverse, that a dextrorse helix has its sinistrorse inverse, that a right hand has its possible left.

And hence, if the mysterious influence to which the dissymmetry of natural products is due should come to change in sense or direction, the constituting elements of all living beings would take an inverse dissymmetry. Perhaps a new world would be presented to us. Who could foresee the organization of living beings, if the cellulose, which is right, should become left, if the left albumen of the blood should become right? There are here mysteries which prepare immense labors for the future, and from this hour invite the most serious meditations of science.

## VIII.

Only because chemistry has been up to the present time powerless in the preparation of dissymmetric bodies, might we fear that we may be always ignorant of the mode of production of the inverse bodies of natural organic substances. Happily this fear is exaggerated. I have ascertained indeed that, by ordinary chemical processes, such as the action of heat, a right body can be changed to its left, and inversely. Thus in warming right tartaric acid under certain determinate conditions, which it would be too long to specify here, it is transformed into left tartaric acid, or rather into paratartaric acid; and inversely, under the same conditions exactly, left tartaric acid becomes right.

Here are ten or twelve grammes\* of entirely pure, left tartaric acid, which were thus procured. Their preparation cost me much trouble. But M. Biot desired to study in a very particular manner the characters of dispersion of this left tartaric acid, so remarkable on account of its origin. He desired himself to be at the cost of the operation; very expensive, because the transformation depends upon the employment of the tartrate of cinchonine or of quinine, and the base is lost because the tartrate must be heated to a temperature which destroys it.

I have prepared by this process sufficient paratartaric acid to take from it twelve grammes of left tartaric acid, which presents rigorously, in an inverse sense, the same optical characters as tartaric acid.

Every analogous transformation of a natural dissymmetric body into its inverse, should be regarded as a great advance in organic chemistry.

## IX.

At the conclusion of our first lecture, I alluded to observations to which it is time we should give all the attention they merit. These observations are relative to the comparison of the physical and chemical properties of right and corresponding left isomers. I have already insisted upon the perfect identity of all their properties, excepting, however, the inversion of their crystalline forms, and the opposition of direction of their optical deviations.

\* A gramme is equal to about  $15\frac{1}{2}$  grs.—Tr.

Physical aspect, lustre of the crystals, solubility, specific gravity, single or double refraction, all is not only alike, similar, very near, but identical in the most rigorous acceptation of the word.

This identity is the more remarkable as we shall see it replaced by a general and considerable opposition of the properties of these same substances, when they are found in particular conditions which I am about to point out.

We have seen that we must distribute all chemical compounds, artificial or natural, mineral or organic, in two great classes; compounds non-dissymmetric with superposable image, and compounds dissymmetric with non-superposable image.

This stated, the identity of properties, of which I have just spoken in the two tartaric acids and their similar derivatives, constantly exists with the absolute characters I have named, whenever these substances are placed in presence of any compound of the class of bodies with superposable image, such as potassa, soda, ammonia, lime, barytes, aniline, alcohol, the ethers—in a word, of all compounds, whatever they may be, not dissymmetric, not hemihedric in form, without action on polarized light.

Submit them, on the contrary, to products of the second class with non-superposable image, asparagine, quinine, strychnine, brucine, albumen, sugar, &c., &c., bodies dissymmetric like them, all changes in an instant. Solubility is no longer the same. If there is combination, the crystalline form, specific gravity, the quantity of water of crystallization, the more or less ready destruction by heat, all differ as much as the most distant isomeric bodies differ.

Here then we have the molecular dissymmetry of bodies introducing itself in chemistry as a powerful modifier of chemical affinities. In presence of the two tartaric acids, quinia does not behave like potassa only because it is dissymmetric, and potassa is not. Molecular dissymmetry is hence offered as a property capable by itself, as far as dissymmetry, of modifying chemical affinities. I do not believe any discovery has yet entered so far into the mechanical part of the problem of combinations.

Let us endeavor to present the cause of these identities and of these dissemblances. Let us suppose a dextrorse helix and a sinistrorse helix separately penetrating two blocks of identi-



cal wood, and in right lines. All the mechanical conditions of the two systems will be the same. It will be no longer so from the moment these same helices shall be associated with blocks, themselves shaped in helices of the same direction, or of opposite directions.

### X.

Here is a very interesting application of the facts which I have just submitted.

Seeing right and left tartaric acids become thus dissimilar solely in virtue of the rotary power of the base, there was room to hope that from this very dissemblance would result chemical forces capable of balancing the mutual affinity of these two acids, and consequently a chemical means of separating the two elements of paratartrac acid. I long sought without success; but I succeeded in it by the aid of two new bases, isomeric of quinine and cinchonine, and I obtain very easily without the smallest loss, by the aid of these latter, quinicine and cinchonine.

I prepare the paratartrate of cinchonine by neutralizing the base, then adding as much acid as was required for its neutralization, I crystallized, and the first crystallizations are formed of left tartrate of cinchonine perfectly pure. All the right tartrate remains in the liquid because it is more soluble. Then itself is crystallized, and under a different aspect, because it has not the same crystalline form as the right [qu. left?] One would suppose that he had to deal with the crystallization of two very distinct salts, of unequal solubility.

### XI.

But the dissemblance of the properties of corresponding right and left bodies when submitted to dissymmetric forces, appears to me to be of the highest interest, in connection with the ideas it suggests on the mysterious cause, which presides over the dissymmetric disposition of atoms in natural organic substances. Why this dissymmetry? why such a dissymmetry in preference to its inverse?

Recur with me in thought to the epoch when, having recognised the absolute identity of the physical and chemical properties of corresponding right and left bodies, I had no idea, not

even a suspicion, of possible differences between these bodies. It is, indeed, many years since I recognised these identities and these differences.

It was then impossible for me to understand how nature could make a right body, without making at the same time a left body. For the same forces which are in play at the moment of the elaboration of the molecule of right tartaric acid, ought, it seems, to give a left molecule, and there should be only *paratartrics*.

Why even rights or lefts? Why not, only non-dissymmetrics, substances of the order of those of inorganic nature?

There are evidently causes for these curious manifestations of the play of molecular forces. To indicate them in a precise manner, would be certainly very difficult. But I do not believe I am mistaken in saying that we know one of their essential characters. Is it not necessary and sufficient to admit that, at the moment of the elaboration in the vegetable organism of immediate principles, a dissymmetric force is present? For we have just seen there was but a single case in which the right molecules differed from their left, the case in which they are submitted to actions of a dissymmetric order.

May these dissymmetric actions, placed perhaps under cosmic influences, reside in light, in electricity, in magnetism, in heat? Are they in relation with the motion of the earth, with the electric currents by which physicists explain the terrestrial magnetic poles? It is not even possible, at the present time, to emit the smallest conjectures in this respect.

But I regard as necessary the conclusion, that dissymmetric forces exist at the moment of elaboration of natural organic products, forces which would be absent or without effect in the re-actions of our laboratories, either on account of the sudden action of these phenomena, or on account of some other unknown circumstance.

## XII.

We come to the last experiment, the interest of which does not yield to any of those which precede, in the proof which it will manifestly afford us of the influence of dissymmetry on the phenomena of life. We have just seen dissymmetry intervene as a modifier of chemical affinities; but it dealt with re-actions

purely mineral, artificial, and we all know how prudent we should be in the application of results in our laboratories to the phenomena of life. Therefore I have reserved almost all the views presented in this lecture until I recognised in the most certain manner, that molecular dissymmetry offers itself as a modifier of chemical affinities, not only in the re-actions of inorganic nature, but in those of a physiological order, in fermentations.

This is the remarkable phenomenon to which I allude.

It has long been known, through the observation of a manufacturer of chemical products in Germany, that the impure tartrate of lime of the factories, soiled by organic matters, and abandoned under water in the spring, may ferment and yield different products.

That stated, I place in fermentation the common right tartrate of ammonia in the following manner:—I take the very pure crystallized salt, dissolve it, adding to the liquid a very limpid solution of albumenoid matters. One gramme of dry albumenoid matters is enough for 100 grammes of tartrate. Very often the liquid, placed in a stove, spontaneously ferments: I say very often; I might add, that it always takes place, if care is taken to mix with the liquid a very small quantity of one of those liquids in which spontaneous fermentation has been obtained.

Thus far there is nothing remarkable; it is a tartrate which ferments. The fact is known.

But apply this mode of fermentation to the paratartrate of ammonia; and, in the preceding conditions, it ferments. The same yeast, or leaven, is deposited. All indicates that things go on absolutely, as in the case of the right tartrate. If, however, we follow the steps of the operation with the aid of the polarizing apparatus, we very soon perceive marked differences between the two operations. The liquid, at first inactive, possesses a rotary power sensibly to the left, which augments little by little, and attains a maximum. Then the fermentation is suspended. There is no longer a trace of right acid in the liquid, which, evaporated and mixed with its volume of alcohol, immediately furnishes a fine crystallization of left tartrate of ammonia.

We remark at first in this phenomenon two distinct things; as

in every fermentation, properly so called, there is a substance which is chemically transformed, and correlatively, there is a development of a body possessing the manners of a mycodermic vegetable. Elsewhere, and it is this which it is important to note at this time, the yeast which causes the right salt to ferment, respects the left salt, in spite of the absolute identity of the physical and chemical properties of the two right and left tartrates of ammonia, whenever they are not subjected to dissymmetric actions.

Observe then molecular dissymmetry proper to organic matters intervening in a phenomenon of the physiological order, and it intervenes here in its character of modifier of chemical affinities. There is not the least doubt in the world about what may be the kind of dissymmetry proper to the molecular arrangement of left tartaric acid, which is the sole, exclusive cause of the difference that it presents with the right acid, under the relation of its fermentation.

And thus is found introduced into physiological considerations and studies the idea of the influence of the molecular dissymmetry of natural organic products, of the great character which establishes, perhaps, the only well-marked line of demarcation, which can be placed at the present time between the chemistry of organic nature and the chemistry of inorganic nature.

### XIII.

Such are, gentlemen, in their totality, the labors with which I have been charged to entertain you.

You have learned, as we advanced, why I have entitled my exposition, *On the Molecular Dissymmetry of Natural Organic products*. It is, in fact, the theory of molecular dissymmetry that we have just established; one of the highest chapters of science, entirely unforeseen, and which offers to physiology entirely new, distant, but certain horizons.

I entertain this opinion of the results of my own researches, without mingling in the expression of my thought any of the self-satisfaction of the author. May it please God that personalities shall never be possible in this chair! These are as pages of the history of chemistry, which we shall successively write, with the sentiment of dignity which a true love of science always inspires.

## ON A SPURIOUS EXTRACT OF JALAP.

BY CHARLES BULLOCK.

At our pharmaceutical meeting in October last, the President, Charles Ellis, called attention to a specimen on the table purporting to be extract of jalap. The sample was part of a lot then offering in considerable quantities in the New York market. A partial examination of the extract having shown that it was sophisticated, Edward Parrish and myself were appointed to make a further examination to ascertain its character.

Preparatory to our remarks on the sample under examination, we give a sketch of the general characteristics of the active cathartic resins usually found in the shop, viz: those of Jalap. Scammony, Podophyllum, and Gamboge, hoping it may be of interest in connexion with our subject.

## RESIN OF JALAP.

The alcoholic extract of jalap consists of two resins; one soluble in ether, and the other insoluble in that menstruum. The medicinal quality of jalap resides in the hard resin, which is insoluble in ether. To this resin Mr. Kayser has given the name of "Rhodeoretine," and attributes to it the formula  $C_{42}H_{35}O_{20}$ . In uniting with bases it fixes one equivalent of water, and becomes a feeble acid called "Rhodeoretinic acid." Soluble in water and alcohol, insoluble in ether, and has a bitter taste.—(Pelouze and Fremy.)

Rhodeoretinic acid is not precipitated from its combination with potash by the stronger acids, on account of its solubility in water.

The alcoholic solution of the hard resin (Rhodeoretine) treated with chlorohydric acid changes the resin into a liquid substance called "Rhodeoretinol" having the formula  $C_{30}H_{23}O_4$ . In the reaction glucose is also formed. Rhodeoretinic acid gives the same result with chlorohydric acid.—(Pelouze and Fremy.)

There exists in commerce another species of jalap (?) which affords a resin particularly acid, soluble in ether, inodorous, insipid, brittle and fusible. This resin has received the name of para-rhodeoretine, and has for its formula  $C_{42}H_{34}O_{18}$ .—(Pelouze & Fremy.)

Rhodeoretine (the hard resin) has the following reactions with reagents:

*In Caustic Alkalies.*—Very soluble and not precipitated on addition of a stronger acid.

*In Carbonated Alkalies.*—Sparingly soluble and only after long digestion.

*In Acetic Acid.*—Very soluble, (Pelouze & Fremy.) [Requires warm glacial acetic acid to dissolve it.]—

*Sulphuric Acid.*—Concentrated sulphuric acid colors the resin a carmine red.—(P. & F.)

*Nitric Acid*, of 35° B. when warm, dissolves the resin freely.

*In Chloroform* it softens, but does not dissolve.

*In pure Benzole* it is insoluble.

#### RESIN OF PODOPHYLLUM.

Podophyllum root, like jalap, contains two resins, one soluble and the other insoluble in ether.

There appears to be a diversity of sentiment as to which of the two resins the activity of the root is attributable.

Mr. J. R. Lewis, (Jour. of Pharm. vol. xix. p. 165,) says, both resins were found to possess the active properties of the root.

Mr. Cadbury (Jour. Pharm. vol. xxx. p. 401) found the ethereal resin the most active. The same conclusion is arrived at by Mr. H. Allen, (Jour. Pharm. vol. xxxi.) while Mr. W. G. Parrish considers the ethereal resin the least active.—(Jour. Pharm. vol. xxxii.)

The following experiments were made with Podophyllin manufactured by W. S. Merrill & Co. of Cincinnati. Ether extracted 63 per cent. Mr. Cadbury found 77 per cent. soluble in ether. The amount of resin soluble in ether appears to vary with the season in which the root is collected. Some experiments detailed in the "American Journal of Materia Medica," for 1859, give 54.34 per cent. as the proportion of resin soluble in ether in Podophyllin made from the root collected in the spring, and 39.95 per cent. from podophyllin made from the autumnal root.

#### *The Alcoholic Resin.*

The resin insoluble in ether has a dark olive green color.

Its taste is slightly bitter, with little or no acrimony, and with but little odor. When heated it intumesces without fusing.

In *Caustic Alkalies* it is soluble, and is precipitated by an acid added to excess.

In *Carbonated Alkalies* it dissolves to a considerable extent in the cold; a moderate heat promotes its solution.

In *Ammonia* the resin is soluble to a considerable extent.

*Chloroform* does not dissolve nor soften the resin.

*Pure Benzole* has no action on the resin.

*Nitric Acid*, 35° B. cold, dissolves the resin, forming a deep red colored solution.

In *Acetic Acid*, No. 8, the resin is nearly insoluble.

Warm glacial acetic acid dissolves it freely.

### *The Ethereal Resin.*

Umber color, furnishing an ochrey yellow powder.

This resin possesses the peculiar odor of the root, is slightly bitter and acrid. It fuses at about 240° F.

In *Caustic Alkalies* it is soluble, but less freely than the other resin; the solution is precipitated by acids in excess.

In *Carbonated Alkalies* soluble to a considerable extent; heat promotes the solution.

In *Chloroform* very sparingly soluble.

In *Pure Benzole* insoluble.

*Nitric Acid*, 35° B. cold, forms an imperfect solution of a red color.

*Sulphuric Acid*, concentrated, dissolves the resin, forming a deep red solution, yellow on the sides of the glass.

*Acetic Acid*, glacial, dissolves this resin, but not so freely as the alcoholic resin.

### RESIN OF SCAMMONY.

By the action of caustic alkalies, resin of scammony is converted into scammonic acid. This acid being soluble in water, the alkaline solution of the resin is not disturbed by addition of an acid to slight excess.

The resin of scammony of Messrs. McAndrew affords a precipitate when its alkaline solution is neutralized by a mineral acid. This reaction would indicate the presence of some resin

other than that of scammony. As the resin of Messrs. McAndrew is not a resin from exudation, but prepared by maceration of the root in alcohol and precipitation by water, it may account for the presence of a resin other than that usually recognised as pure resin of scammony.

In *Acids*.—Warm nitric acid of 85° B. dissolves the resin imperfectly.

In *Chloroform*—Very soluble.

In *Alcohol and Ether*—Soluble.

In *pure Benzole*—Insoluble.

In *Aqua-ammonia*.—Soubeiran states that the resin dissolves in the menstruum, the solution having a beautiful green color.

The pure resin is very sparingly soluble in ammonia, and only after long standing. The presence of some copper salt derived from the vessels used may perhaps account for the green color; the partial solution of the resin being yellow, a combination with the blue of the copper salt would afford a green color.

The resin of scammony fuses at 142° C. [351.5° F.] and has the formula  $C_{40}H_{68}O_{20}$ .—(Pelouze & Fremy)

#### RESIN OF GAMBOGE.

The resin of gamboge has decided acid properties. Its combinations with the alkalies are red, and separate like soaps on the addition of chloride of sodium. The formula of the resin according to Büchner, is  $C_{60}H_{35}O_{12}$ . The gum which accompanies the resin has, according to Büchner, the same composition as starch.—(Pelouze & Fremy.)

Nitric acid 35° B. when hot, decolorizes the resin, leaving it crisp and friable.

In *Ether and Alcohol*—Soluble.

In *Chloroform*—Very soluble.

In *pure Benzole*—Very soluble. [Pure benzole dissolves nearly its own weight of alcoholic resin of gamboge.]

#### EXAMINATION OF SOPHISTICATED EXTRACT OF JALAP.

*Color*, not as dark as extract of jalap; when pulled, becomes yellow on the edges. *Odor* deficient.

*Taste*—Very slightly bitter and not acrimonious.

*Strong Alcohol* extracted 69 per cent. of soluble matter.

*Ether* dissolved 34 out of the 69 per cent. of alcoholic extract.



That part of the alcoholic extract not soluble in ether, is a soft resin, soluble in caustic potash, and is precipitated by acids in excess.

*Acetic Acid* dissolved the resin, forming a muddy yellow solution.

*Sulphuric Acid*, concentrated, chars and dissolves the resin.

*Nitric Acid*, 35° B., when cold, forms with the resin a turbid yellow solution.

The ethereal resin has a red color, yellow on the edges.

*Caustic Alkalies* dissolve the resin freely, forming a red solution.

*Nitric Acid*, 35° B. when hot, decolorizes the resin, rendering it crisp and friable.

*Chloroform* dissolves the resin freely, forming a light yellow solution.

*Pure Benzole* dissolves the resin freely, forming a light yellow solution.

When chloride of sodium is added to the alkaline solution of the resin and heated, the resin separates entirely.

The extract contains 8 per cent. of inorganic matter, which effervesces on addition of acid.

*The hard or active resin of Jalap* is distinguished from the other resins we have considered, by not being precipitated from its combination with the caustic alkalies, when acid in excess is added.

*Podophyllin* differs from the other resins, by its solubility in the carbonated alkalies, and by dissolving in cold nitric acid of 35° B. forming a deep red solution.

*Resin of Scammony* is insoluble in benzole, but soluble in chloroform, thus differing from jalap and podophyllin which are insoluble in chloroform.

*Resin of Gamboge* differs from all the other resins by its ready solubility in pure benzole, and separating from its alkaline combination on addition of chloride of sodium.

From these experiments we deduce the conclusion that the extract under examination owes its medicinal qualities to 34 per cent. of resin of gamboge, equivalent to 42 per cent. of gamboge contained in it, and contains no resin of jalap or podophyllin.

Philadelphia, January, 1862.

## REMARKS ON THE ANALYSIS OF BRANDY.

BY SAMUEL P. DUFFIELD, Ph. D.

To the Editor of the American Journal of Pharmacy :

*Dear Sir,*—As a desire was expressed by the Committee appointed for the Revision of the Pharmacopœia, that there should be free contributions from all members, to that end, on the topics most suited to their tastes, or on those subjects in which they had had more than ordinary experience, I trust that it may not seem out of place for me to tender an article on the subject of "Pure Brandy," the "*Spiritus Vini Gallici*" of our National Dispensatory. When introduced by that work as a remedial agent, reference was had to *distilled wine*, not to a factitious compound, which has now almost the sole occupancy of our market.

For the past four years I have made analyses of liquors in those cases in which they came, on my order for my stock for dispensing, &c. On these orders I always distinctly stipulated that they should be pure articles.

I ordered from New York and Philadelphia importers, feeling assured that if I dealt directly with houses of highest note in commerce, I would be very likely to find the pure article in question. To my utter astonishment every one proved to be manufactured, either in this country or abroad. I subjected the articles to their order.

At last, despairing of ever being able to procure any article suitable to use as a remedial agent, and having actually lost faith in the chemical reagents, (for not a single sample proved, when tested by them, to be genuine), I thought, before accusing importing firms any more, I would prove the truth or fallacy of Normandy and Hassal's experience. My father had manufactured some wine from Isabella grapes, which grew around our piazza, and he gave me a bottle (at that time two years of age) to experiment with. I distilled from one pint of wine four fluid ounces, and as the distillate began to lose in alcoholic strength, stopped at that quantity. The distillate was clear as distilled water, with more marked ethereal odor than any commercial article I had met with. On subjecting it to "Gay Lussac's dry distillation," "Molnar's test," and "Kent's sulphuric

acid test," it remained unchanged, proving the absence of grape fusel oil, with which the *marc* brandies are loaded. Here was evident proof that Chevallier, Accum, Normandy, Hassal and Mitchell were correct in their experiences, and that the tests given were reliable.

Shortly after this I was written to by a New York house, whose brandy I sent back, to give them my system of analysis, in order that they could test its accuracy, by practical application, in their own hands. About two weeks after, I received a letter stating "they had subjected the article I refused to the analytical process furnished them, and *all was right, except it lost the 'bouquet,'*" and he asks, "where can this 'bouquet' have gone to; it is neither in the contents of the retort, nor in the distillate." In that very sentence he branded his article impure. As I held out to have pure and attested articles, I was constantly applied to to furnish pure brandy, but could not, for upwards of two years, meet this demand.

Mr. Charles Carpenter came into my laboratory while experimenting on the most economical method of preparing oil of wine, and showed me a sample of what he stated was pure brandy. I subjected it to analysis and found it to be of similar character with that manufactured by Zimmerman & Co., though freer from grain oils than the sample analyzed by Mr. E. S. Wayne and described in one of the back numbers of your valuable Journal. I described to him what I desired, and he said he had been to Cincinnati, and there was nothing there but *marc* brandy, and I would seek in vain for distilled wine in the United States.

After an explanation of the process, he agreed to distill me twenty gallons as a trial. I send you herewith a sample, and desire, if you feel so disposed and have the time, to subject it to all the tests known to chemists. The article in question is distilled from *Catawba wine* of three or four years of age, and could be furnished at twelve dollars the gallon. We retail it at sixteen the gallon, paying the price above for it, and give one ounce for the same rate, (one shilling.) Of course there is not the same amount of profit which could be secured by the sale of common "Rochelle" at four and six dollars per gallon, but I trust that the majority of apothecaries of the Philadelphia

school have a higher aim than illegal gain. The apothecary should be qualified to test all his articles, both chemically and microscopically, and then we would have a different class of articles passing through the hands of the wholesale jobbing houses, for they would have to supply the demand or fall.

The system of analysis I would suggest as simple and adequate to the apothecary's wants on the subject, would comprise five divisions :

- 1st. Per centage of alcohol.
- 2d. The quality and origin of liquor used as the base of the factitious brandy.
- 3d. Detection of bitter almond oil, almond cake, and cherry laurel water.
- 4th. Detection of aromatics.
- 5th. Detection of mineral poisons.

#### *1st. Percentage of Alcohol.*

Take of the suspected brandy a pint, introduce it into a tubulated retort, and distill eleven fluid ounces.

Take the specific gravity of the liquid distilled, and from the tables under the head of alcohol in the U. S. Dispensatory, find the percentage of alcohol; reserve both the distillate and the residuum in the retort for *further tests*.

#### *2d. The quality and origin of the liquor used as THE BASE OF THE FICTITIOUS BRANDY.*

I would suggest that "Molnar's Test," (transactions of the Am. Pharm. Association of 1858, or 59,) be used for this purpose. It is also given in the Annual of Scientific Discovery, in one of those years. In connection also employ "Gay Lussac's dry distillation process. As most of your readers may not be conversant with the process, I give it below in full.

About two ounces of the suspected brandy is mixed to the consistence of a thick mortar, with powdered fused carb. potassa. The vino-ethereal odor will be unimpaired if the specimen was pure. If not, the peculiar odor of the liquor forming the base of the article will be brought out *clearly*.

3d. *Detection of Bitter Almond Oil, Almond Cake and Cherry Laurel Water.*

Should either of these be sought for, the pharmacist takes the distillate obtained in process, *first*, for the purpose of estimating percentage of the alcohol, and adds to it a small amount of caustic potassa solution, enough to give it a distinctly alkaline reaction, and evaporates to a small bulk. To this liquid add a few drops of a solution containing a mixture of proto- and sesquisulphate of iron, add now hydrochloric acid, to a decided acid reaction. If the liquid assumes a blue tint, the brandy has been flavored with cherry laurel water, oil of bitter almonds, or almond cake. To those who desire a still more delicate reaction, the "Liebig sulpho-cyanide test" is recommended.

To the distillate obtained in the first process as above, caustic potassa solution is added, the bulk of spirit reduced as before, by evaporation on a water bath. Hydrochloric acid is added to an acid reaction, and then a few drops of sulphide of ammonia solution ( $\text{NH}_4\text{S} + \text{HS}$ ), and the whole heated until colorless.

If now perchloride of iron solution be added (a few drops only,) the liquid assumes a blood red color if prussic acid or its compounds were present.

4th. *Detection of aromatics and acid substances.*

The residual liquor in the retort is evaporated to the consistency of simple syrup, and the taste will generally detect their presence.

Pure brandy should leave no such substances as a residuum.

5th. *Detection of the metals.*

For the method of detecting these, ample directions are given under their individual names in our national Dispensatory. In addition to Gay Lussac's and Molnar's test, that of Prof. E. Kent of New York, by concentrated sulphuric acid, can be used.

*Detroit, Mich., Jan. 10th, 1862.*

NOTE ON THE BARTRAM OAK (*QUERCUS HETEROPHYLLA*.)

By S. B. BUCKLEY.

The Bartram Oak (*Quercus heterophylla*, *Mx.*) has long been regarded by most American Botanists as a hybrid. Accompanied by Mr. Procter, Editor of the Journal of Pharmacy, I lately went to Mount Holly, near Burlington, in New Jersey, to see an oak with leaves of varied forms, many of which correspond in shape with the figure of the Bartram Oak in Michaux's Sylva. It is less than one-fourth of a mile from the depot at Mount Holly,\* in a thicket near several willow oaks (*Quercus phellos*), of which it is plainly one. It has all the characteristics of body, limbs and acorns, peculiar to the willow oak. Many of its leaves have the ordinary form of *Quercus phellos*. Michaux, in his description of the *Q. heterophylla*, says that several young plants of the Bartram Oak have been placed in the public gardens to insure the preservation of the species. One of these, which was grown from an acorn of the original Bartram Oak, was planted in the Bartram Garden. Col. Carr, who succeeded Bartram in the ownership and possession of the garden, showed this tree to Mr. Meehan of Germantown, who had charge of the Garden during two years. With Mr. Meehan, a few days since, I visited this tree. It also is a *Quercus phellos*. It has very few lobed leaves; indeed there is scarcely one in fifty of them lobed.

In Mr. Durand's herbarium are specimens of *Quercus phellos* with lobed leaves like the Bartram Oak, which he received from Columbia County in this State, where such forms of the willow oak are said to be quite common along the banks of the Susquehanna. The Bartram Oak is not a hybrid, but a mere form of *Quercus phellos*, which, like most American oaks, varies greatly in the shape of its leaves.

Since writing the above I have seen a specimen from the original Bartram Oak, which has both lobed and entire leaves, showing beyond question that it is a form of *Q. phellos*. This specimen is now in the general herbarium of the Academy of Natural Sciences at Philadelphia.—*Proc. Acad. Nat. Sci. Phila.*

After the preceding was placed in the hands of the printer,

\* On the farm of Mr. William Rossell.

I saw a young oak in the grounds of Joshua Hoopes, at West Chester, Pa., which was grown from an acorn obtained from a tree in the Marshall Garden, a few miles from West Chester, which was raised from a scion or acorn of the original Bartram Oak. The Hoopes tree is about fifteen feet high and three inches in diameter. It has all its leaves lobed, and in foliage has no resemblance to the willow oak. This may arise in part from its young and vigorous growth, there being often a tendency in young trees to have different foliage from what they wear at maturity ; however, this is not often the case with the willow oak. Mr. Hoopes told me that most of the leaves of the Marshall tree were also lobed. Should these trees maintain their characteristics and be propagated, the Bartram oak may become an example of the formation of a new species from a form of an old species.

That new species are being constantly made slowly and gradually, is believed by many botanists, yet the shortness of human life, and our limited observations, prevent us from seeing and proving it.

It is desirable that the trees alluded to should be preserved and propagated to test the question for the satisfaction of future enquirers.

Now the Bartram Oak is a variety of *Quercus phellos*, but time may cause it to be a good species.

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#### ON COMMERCIAL BELLADONNA LEAVES.

By J. M. MAISCH.

*Atropa belladonna*, Linn. grows in the greater part of Europe in moist woods. Besides the root, the leaves are of great importance as medicinal agents, and, as far as my observation reaches, much more frequently employed in this country than the root. The chief pharmaceutical preparations for which they are used, are the tincture and the extract, a considerable quantity of the latter being manufactured here on the large scale, and the consumption of the by far largest portion of the imported leaves is undoubtedly for this latter purpose.

Belladonna leaves are imported into this country chiefly, if

not exclusively, from England and Germany. The former, as we learn from discussions before the London Pharmaceutical Society, in consequence of a paper by P. Squire, "On Medicinal Extracts," (*Pharm. Jour. and Trans.* iii. 300—308,) are perhaps solely derived from plants cultivated for this purpose and for the manufacture of the extract. True English belladonna I have always seen imported in wide-mouth bottles, holding one pound or more. They are generally of a lively green color, intermixed with none or but few leaves having a brownish tinge; frequently they are broken, but occasionally I have observed the great bulk of the leaves entire and but little broken. The appearance of the leaves indicates that they have been very rapidly dried, most likely by artificial heat, because only by rapidly conducting this process can the color of the leaves be preserved of a pure green, while by prolonging it the upper surface will invariably assume a brownish green or even a greenish brown shade. This change of color alone does not impair the medicinal virtues, unless the leaves have, while drying, through gross carelessness, been heated spontaneously to such a degree as to darken the upper surface to a dull brown, devoid of any tinge of green, and to change the greyish green of the lower surface to a lighter or deeper brown. As far as the color is concerned, then, the leaves ought not to be deeper colored than merely brownish green above and greyish green beneath.

In Germany, where I believe belladonna is not cultivated, but gathered from the wild growing indigenous plants, it would be almost impossible to dry them, as in England, by artificial heat, and it can for this reason be scarcely expected to obtain German belladonna in large quantities of the pleasant color of the English leaves. Indeed, German belladonna, as it comes to the American market, bears by its physical properties evidence of having been dried without the application of artificial heat; it is usually imported in bales of various weight.

I have frequently heard that German herbs and extracts, as a general rule, bear no good reputation in the United States, and German narcotic extracts which I have occasionally observed, were certainly much below even very moderate requirements. Whoever has looked into the apothecary stores in Germany, and into the German stores, the smallest ones perhaps excepted,



in our large cities, which generally keep German herbs and pharmaceutical preparations, must acknowledge that excellent herbs, &c. can be obtained from Germany as well as from other countries. But there appears to be a certain class of drug exporters in Germany who consider anything good enough for the American market; and of importers in this country, who buy an article, no matter of what quality, provided it is cheap and labelled like the best one. In confirmation of this statement, I need but refer to the controversy in some German journals, a short time ago, between large distillers of volatile oils, when one firm frankly acknowledges that the *oleum carui ex stipiti*. noted in their price lists, was not what it pretended to be, the oil distilled from the chaff and stalks, (*Kümmelspreu*), but distilled from the same with the addition of oil of turpentine, and that it was prepared solely for the foreign (American) market; thus it is that a pound of so-called oil of caraway may be bought here at the price of about an ounce of the true oil.

If there were no buyers here for such adulterated stuff, the manufacturers and exporters in Europe would soon find it an unpaying business; as long, however, as they can profitably dispose of their sophisticated articles, it would be folly to expect them to give up their most honorable traffic. The appointment, some years ago, of drug inspectors at the various ports of importation, was hailed as a progress by all right-minded men, and as the surest means for preventing our market from being overflowed by worthless merchandize. But the prostitution of this office for political purposes is the surest way to counteract the good intentions of the law. In the following I propose to show the quality of some parcels of belladonna, and we may well wonder how it was possible that some of these bales could have passed the examination of the so-called drug inspector.

A short description of the leaves in question may precede the investigation. Belladonna leaves ought to be gathered during the months of June and July, while the plant is in blossom, and before the top flowers have fully expanded. The leaves are arranged alternate, usually two growing from the same place, of which one remains small; their shape is ovate-lanceolate, pointed, tapering into the margined petiole, or the uppermost sessile, with the margin entire; they are smooth and dark green above, lighter

green beneath and glandular hairy on the veins and petioles. On drying they become very thin, and appear semi-transparent when held up to the light; their color in the dry state has been mentioned above.

Dr. E. R. Squibb, of Brooklyn, a few weeks ago, met with a bale of German belladonna, which he found largely adulterated with fragments of the leaves of *digitalis*; he very kindly furnished me with a sample of the same. Comparatively few of the belladonna leaves present the characteristics of having been carefully dried; many are dark colored and even nearly black. From these the broken leaves of *Digitalis purpurea*, Linn., are readily distinguished by their different color, the soft white hairs, the net of prominent white veins, and the purplish midrib on the lower side. On closer examination, I detected some leaves of *Solanum nigrum*, Linn., known by their ovate shape and sinuate toothed margin, of *Solanum villosum*, Willd., resembling the former, but villose on both sides, and the upper end of a twig, the leaves of which are somewhat crowded, much perforated by insect bites, and of a rather thicker texture and smaller size than belladonna leaves, but otherwise resembling them in shape. The latter I take to be those of *Atropa belladonna*, as well as some fragments of withered brownish yellow leaves, the base of which is less attenuate and inclines more to oval oblong. They might, however, belong to *Scopolia atropoides*, Schultes, which Professor Wiggers (*Pharmacognosie*, page 278) states are apt to be confounded with belladonna leaves, and which are described as petiolate, oval oblong, smooth, entire, and somewhat rugose; I am not acquainted with this latter plant, that grows in south eastern Germany, Hungary, Croatia, &c. A very few branches of moss might be overlooked as accidental impurities. Among the finer portion of the leaves, I found some flowers and fully developed fruits of belladonna, small leafy portions covered with a dense wool, probably from *Verbascum thapsus*, Linn., calyces of a labiate plant, nearly pentagonal, regularly and sharply five-toothed, ten-ribbed and containing brown, slightly netted-veined nutlets; also some sections of a longitudinally wrinkled, dead herbaceous stem.

The barefacedness with which such an article had been put up for exportation, the faithful simplicity and happy ignorance

with which it was offered to a careful and conscientious man, are fit subjects for serious contemplation. How did this German belladonna get to New York? Did it really pass the custom house? And had it been examined by the drug inspector? Any how, it was labelled belladonna and it contained some. The matter, however, is too serious to be treated lightly, and it seemed to me interesting to examine other specimens of belladonna leaves.

The next lot which I was fortunate enough to fall in with presented another kind of adulteration, so apparent in its character that it is difficult to conceive how an apothecary of the most ordinary attainments can sell it. About 25 per cent., I should judge, consist of portions of the stem, leaves and fully developed capsules of *Hyoscyamus niger*, Linn. An accidental admixture of these to belladonna is not possible, from the fact that both had been evidently mixed while drying, and were folded around each other. The greatest part of the leaves were so much broken as to prevent their identification; but among this finer portion I found some fruits of *Malva rotundifolia*, Linn., a few small syngenesious flowers, and the shrivelled half-expanded flowers with a short corolla and included stamens, about the size of belladonna flowers, but quite distinct from them.

A third sample, apparently likewise of German origin, consisted of true belladonna leaves, which were, however, gathered at an improper season. None of the leaves exceeded two inches in length; a great many measured between half and one inch, and were partly still attached to the slender tops of the branches. They were collected before flowering, and their active principles were therefore not fully developed; for Professor Schroff has demonstrated that the leaves as well as the root are most active in July, during the period of flowering; otherwise the leaves were unobjectionable, being entirely free from any impurities whatever.

Upon application, Messrs. John & Cramer, of Philadelphia, kindly sent me a sample of their belladonna, which had been collected on the Niederwald near Wiesbaden, Germany, and was imported from Edmund Hardy, in Mayence. This is an excellent specimen, consisting solely of leaves, measuring besides the petiole from two to four inches, and having all the char-

acters of vigorous belladonna leaves, which evidently have been dried with great care, the lower surface being of a bright cinereous green and the upper surface of a green color, sometimes with a slight brownish tinge, and but rarely of a deeper brownish green; they possess the slight odor and the insipid somewhat bitterish æcid taste of well dried belladonna leaves. No stems, flowers or fruits of the belladonna are found in it, and the most careful examination showed likewise the absence of all other vegetable products. The sample is equal in every respect to any derived from England, and superior to many that I have seen, because there is scarcely a broken leaf among them, so that each one may be individually examined from the base of the petiole to the apex of the blade.

I had occasion to examine a package of German belladonna, which is put up similar to the packages of the Shakers, only longer and broader and less in thickness; it was marked as follows: Actien-Gesellschaft für Fabrikation comprimirter Gemüse in Frankfurt-am-Main. Folia Belladonnæ "Warnecke's" Patent in England. It contains besides the leaves, portions of the stems or branches, some berries and a few flowers of belladonna. The whole had been well dried, and the care taken with this process and with the packing and cutting was evident; the absence of any foreign intermixture speaks likewise well for the selection of the proper herbs. But the presence of other portions of the plant and of some decayed belladonna leaves exclude these packages from the use for preparations of our Pharmacopœia, which directs the leaves only. Although it may be inferred from the above mentioned discussion in the London Pharmaceutical Society that the soft parts of the plant, *together* with the flowers and fruit, yield an extract stronger than that of the leaves, still it must be remembered that the plants were collected in September and had been kept back in growth by severe frosts in the spring. Schroff states distinctly that after July the strength of the leaves is diminished, and in the fall they are nearly inactive. It is well known that the fruit is extremely poisonous, and the reliability of most English extracts is probably in part due to the use of the fruit in preparing it. Is such a deviation from the Pharmacopœia, in fact from nearly all Pharmacopœias, warranted? I think not. A deviation in one instance will be the cause of others; why then have a Pharmacopœia? The proper

way, certainly, is to await the experiments of different physiologists, not only with cultivated plants, but chiefly with the wild growing; in the mean-time, as long as our Pharmacopœia recognizes the leaves only as officinal, the stems, flowers and fruits ought to be rejected. The above package contained 79.5 per cent. of leaves with the petioles, 7.5 per cent. of stems and branches, 1.9 per cent. of flowers, 4.1 per cent. of fruit and 7 per cent. of decayed belladonna leaves.

Besides the above different lots, I have examined a package of compressed belladonna leaves from New Lebanon, the general appearance of which was pretty good; the compression, however, had been carried to such an extent that the larger leaves were mostly broken, and some smaller ones only, measuring half to one inch, could be separated entire by soaking in water and carefully unfolding them. The base and apex of a number of leaves were found, indicating by their size and shape that the whole leaves rarely exceed two inches in length, thus apparently justifying the conclusion that the leaves had been either gathered rather early in the season, or that probably the cultivated plant in America does not attain the size of belladonna growing wild in those countries where it is indigenous. Moreover the prepossession against cultivated narcotic herbs has not been refuted by comparative chemical analysis, that I am aware of. This package of American-grown belladonna leaves contained none of the thicker portions of the stem and branches, and but few of the most tender tops of the latter, in no case exceeding one inch; flowers and fruit could not be detected in a half-pound package.

The results of the above investigations clearly demonstrate the necessity for every pharmacist to select belladonna leaves and probably other narcotic herbs with the greatest care. But if such adulterated articles cannot be sold to the dispensing pharmacist, is it not likely that they will be worked up into extracts which in many instances will defy all examination? It is certain that under our present laws the importation of spurious drugs is not prevented, and it would appear to be the interest of the medical as well as the pharmaceutical profession to consider the manner in which such an evil can be remedied.

*New York, January, 1862.*

VOLUMETRIC ANALYSIS OF PREPARATIONS CONTAINING-  
PRUSSIC ACID, OIL OF BITTER ALMONDS, &c.

By W. H. PILE, M. D.

Read at the Pharmaceutical Meeting of the Philadelphia College of Pharmacy,  
January 7th, 1862.

Owing to the minute quantity of prussic acid in the distilled waters containing that substance, it requires great nicety in ascertaining the percentage strength, by the usual method of precipitating by nitrate of silver, and drying and weighing the resulting cyanide; manipulations which likewise occupy considerable time.

Liebig, to whom science is so much indebted, devised an exceedingly ingenious plan for the same purpose, which is unexceptionable in point of accuracy. But as measuring is much more rapidly performed than weighing, it occurred to me to reduce Liebig's process to a volumetric analysis, and thus put it in the power of the pharmacist to ascertain speedily and satisfactorily the medicinal value of several remedial preparations, which not unfrequently he is called upon to dispense, and which, unfortunately, will be found in too many instances either entirely inert or most sadly deteriorated in efficiency.

For this purpose I prepared a test solution of nitrate of silver of such strength, that for every measure of it employed in the analysis, a quantity of prussic acid would be indicated, showing the proportion of one-tenth of one per cent in any liquid under examination, and as less than one-tenth of a measure of the test solution occasions a perceptible change in the appearance of the liquid, a difference of one grain in ten thousand is thus readily detected.

The rationale of the process is as follows: prussic acid when combined with potassa, forming cyanide of potassium, has the property of rapidly dissolving freshly precipitated cyanide of silver, in such quantity that one grain of anhydrous prussic acid combined as above, will hold in solution all the cyanide thrown down from 3.148 grains of nitrate of silver, and forming with it the soluble double cyanide of silver and potassium. Now if more than that quantity of silver be added, the excess being precipitated as oxide, and remaining undissolved, renders the liquid turbid. The quantity of the test solution employed is thus easily determined, and the amount of prussic acid directly indicated.



The *test solution* which I have referred to, is simply a solution of nitrate of silver, made by dissolving 40 grains of pure fused nitrate in 2373 grains of distilled water.

*Description of the test tube.*—This tube, which is represented in the figure, is about half an inch inside diameter, and 12 inches long, is closed at one end and finished at the other with a thin edge and without a lip, so as to be securely closed with the thumb. The graduations are made by weighing off distilled water in successive portions. Thus to the lowest mark (a) the tube contains 20 grains. To the next line above (marked on the tube  $\frac{1}{2}$ ) 40 grains more, to the line marked  $\frac{1}{2}$ , 40 grains more, and to the line marked 0, being the commencement of the percentage scale, 80 grains more, or 180 grains in all. The measures of the scale, each marked to indicate one-tenth of one percent, have the capacity of 30 grains each, and are subdivided into 10 parts.

All the above marks are drawn as tangents to the lowest point of curvature of the liquid in the tube (see a in the figure) and should always be so read off.

#### *Process of Analysis.*

1st. Drop into the tube about half a grain of common salt,\* and fill up to the lowest mark with solution of caustic potassa, (U. S. Pharm.) allowing the solution some time to settle down to its proper level.

2d. Carefully fill up to the line 0 with the liquid to be tested, avoiding the slightest excess.

3d. Drop into the tube the test solution, shaking after each addition, until the precipitate which appears, ceases to be redissolved, and the liquid shows a slight cloudiness remaining.

4th. The surface of the liquid now indicates the percentage, which is that of the volume of the liquid; and as the specific gravity of the distilled medicated waters do not differ appreciably from pure water, it will also represent the percentage by weight.

\* Chloride of sodium, being the most delicate test for silver is added, in order to detect the minutest excess above that necessary to form the double cyanide of silver and potassium.

5th. Where great accuracy is required, as in analytic investigations, or where the liquid tested has a density differing considerably from that of water, it will be necessary to divide the percentage first obtained by the specific gravity of the liquid under examination; the quotient will give the percentage strength by weight.

6th. In determining the amount of prussic acid in oil of bitter almonds, or oil of cherry laurel, dissolve 20 minims of the oil in enough liquor of potassa to make up when filtered 5 fl. 3. Test this clear solution as before directed, and multiply the observed result by 15, and divide by the specific gravity of the oil.

7th. In cases of liquids having a greater percentage of prussic acid than the tube will indicate, as the medicinal prussic acid, &c. instead of filling up the liquid to the line 0 of the tube, fill only to that marked  $\frac{1}{4}$  or  $\frac{1}{2}$ , and then up to the line 0 with water. After the operation is finished, multiply the result by 4 or 2 according as the line  $\frac{1}{4}$  or  $\frac{1}{2}$  was taken.

In repeating any of the processes already mentioned a second time for verification, nearly the whole amount of the test solution as indicated by the first trial, can be poured in at once, and then drop by drop, till the proper quantity as shown by the turbidity is added.

In conclusion I may state, that in trials made with various lots of cherry laurel water, I have met with some that contained scarcely a trace of prussic acid, and therefore as a remedial agent was entirely worthless; while in others, the proportion varied from the minutest quantity up to the full average strength, which is about one-tenth of one percent. In view of this great uncertainty, allow me again\* to refer to the following substitute for the distilled cherry laurel water, which will be found upon analysis to contain the above proportion of prussic acid.

R. Medicinal Prussic Acid,	fl. 3i.
Oil of Bitter Almonds,	℥ij.
dissolved in	
Alcohol . . . . .	3ij.
Distilled Water, q. s.	ft. fl. 3iij.

\* The original of this formula I proposed to the Philad. College of Pharmacy several years ago.



## ON THE PREPARATION OF RESIN OF PODOPHYLLUM.

By EDWARD PARRISH.

Under the head of *Eclectic Pharmacy*, I contributed an essay to this Journal in 1851, (vol. xxiii. page 329,) detailing a few experiments on the preparation of the Podophyllin of commerce and other impure resins which were then but little known, being prepared by a very few manufacturers, and prescribed almost exclusively by the so-called Eclectic practitioners. Since that time several of these preparations have gained a celebrity in the profession both in this country and Europe, which vindicates their claim to a place in the Pharmacopœia, and we may accordingly look for representatives of this new class of pharmaceutical products in the forthcoming edition of our National Standard. Having been lately engaged upon this resin, for the double purpose of trying a formula and furnishing a characteristic sample of the product, I have noted some of my observations and results which are now presented for what they are worth, to those who may have occasion to use them.

The process for resin of podophyllum consists in exhausting May apple root with strong alcohol, concentrating the tincture, and throwing it into water to precipitate the resin; collecting, washing and drying this. Upon each of these points a few comments are offered.

1st. *Exhausting the root.*—In my former experiments I used the steam displacement apparatus invented by the late C. Augustus Smith, and found alcohol at the boiling point, used in this way, to produce a very concentrated tincture, though the use of the steam displacer involves a good deal of unnecessary trouble in small operations. For treating one or two pounds of the powdered root, which should be fine, a large funnel is convenient; the powder being moistened with a very little, say six fluid ounces of alcohol to the pound, and poured upon a plug of tow or cotton in the apex of the funnel, well shaken and packed after each addition. On a further addition of alcohol the tincture passes drop by drop, very strong, so that a pound may be thoroughly exhausted with from one and a half to two pints. The proper point to desist from the addition of the menstruum is conveniently

ascertained by dropping the percolate into water, when, if it contains an appreciable portion of resin, each drop will occasion a slight cloudiness.

*2d. Concentrating the tincture.*—In large operations it will be desirable to recover the alcohol, which may be done with very little trouble with a pharmaceutical still. In evaporating a pint or two of the tincture, an evaporating dish on a sand bath, or submitted to the regulated flame of a gas furnace, will serve a good purpose. The extent of the evaporation is a point of importance, to determine which I have made a number of experiments. If the tincture is not concentrated enough, a considerable proportion of the resin will remain in solution when added to water; if too much, it will not mix with water sufficiently to produce a favorable separation of the resin; in the case of a recipe furnished with a view to its insertion in the Pharmacopœia, I obtained three-fourths as much resin on the partial evaporation of the liquid after the separation of the first precipitate, as was precipitated on the original admixture with water. The best point at which to arrest the evaporation appears to be at from  $2\frac{1}{2}$  to  $3\frac{1}{2}$  fluid ounces of the evaporated tincture to each pound of the root treated.

*3d. Precipitating by water.*—The proportion of water to which the evaporated tincture should be added is not unimportant. I think four parts of water to one, is perhaps most desirable. If the specimen of the root treated was highly resinous, and the extraction was very complete, the alcoholic fluid extract may be rather thick and even of a syrupy consistence at the degree of concentration above indicated; in this case it is better to add it to the water while hot and comparatively fluid.

*4th. Collecting the precipitate.*—In some instances, in which this process has been varied to test the eligibility of certain modifications, the resin has been so imperfectly precipitated as in part to pass through a filter, remaining suspended in the filtrate; in others, though arrested by the filtrate, it could be only partially separated after drying; in no case could it be successfully collected by subsidence, so that several experiments were made to find the best method of collecting it. The most successful of these consisted in heating the whole aqueous liquid

as contained in the precipitating vessel in a water bath till, just below the boiling point, nearly all the resin was fused and collected on the bottom and sides of the jar, then by a spoon or spatula the main portion could be collected together, and by rotating the mass, all adjacent particles could be made to adhere to it. The "Eclectics" are in the habit of adding muriatic acid to the water to aid the separation of the resin. I have found this highly advantageous both with reference to collecting the precipitate as only partially separated by water alone, and to procuring the remaining portion after the more completely separated precipitate has been removed. There is an objection on the part of some to such an addition under the supposition that the change must be a chemical one, but I observe no difference between specimens whether collected with or without this addition, and am inclined to attribute the more complete coagulation of the particles of resin under the influence of the acid, which may be used in very small proportion, to a mechanical rather than a chemical alteration.

*5th. The drying of the precipitated resin in powder is not a very easy matter. It is rather unsuitable to wrap in paper, especially where artificial heat is to be used, which is apt to fuse it and occasion its absorption by the paper. In one case in which it had been collected on a filter, I was obliged to redissolve it in alcohol, and then pour it out on plates of glass in the manner directed for citrate of iron. It was readily scraped off from the glass but was not in handsome scales. If collected in mass by fusion under water, as above described, it may be kneaded and pulled so as to wash it thoroughly and lighten its color, and may thus be dried without the least difficulty by wiping with paper and exposing to the air at ordinary temperatures. If preferred in powder it is readily reduced by trituration. I prefer it in lumps or pieces, in which condition it is more characteristic, and resembles resin of jalap of the shops. It is more characteristic, and less liable to sophistication or adulteration, when in the condition of broken mass, than in that of powder in which it is usually sold.*

*The yield, by the process described, varies from three to five percent. of the root; there is, perhaps, always some loss in the course of the process, which is proportionably less in operating on large quantities.*

*The name* recommended, and, it is believed, adopted in the new Pharmacopœia for this remedy, is that indicated in the title of this essay, *Resina Podophylli*; it is to be hoped we shall adhere to this in preference to the misnomer Podophyllin, which, despite its belonging exclusively to the pure crystalline principle of the root, has obtained general acceptance in commercial and even in professional circles, as applied to the amorphous resinous product. Looking to a clearer and more discriminating nomenclature, let us also cease to apply to it and its congeners the term resinoid. If they are not resins, to what shall we apply that term?

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#### PHARMACEUTICAL NOTICES.

BY WILLIAM PROCTER, JR.

*Syrup and Fluid Extract of Seneka.*—Many have observed that syrup of seneka, which whilst hot is perfectly transparent, will frequently, on cooling, be cloudy without precipitating any separated substance. The consistence is often much thicker and less mobile from this cause, which is due to the presence of pectin or pectic acid. The transparency of such cloudy syrup of seneka may be restored by the addition of a small quantity of bicarbonate of potassa, with heat; about four grains to the fluid ounce will usually be sufficient. A drachm of bicarbonate is put in a mortar with a few drops of water, say a fluidrachm, and triturated till the crystals are entirely broken down; then gradually add a pint of the syrup of seneka and mix them. Without heat the reaction is too slow; the syrup is therefore poured into a capsule and heated until effervescence ceases. This may conveniently be effected without loss from evaporation, by heating the syrup, contained in a bottle which it half fills in water-bath, with occasional agitation of the syrup until effervescence ceases. It is then allowed to cool. If a large quantity is acted upon in an open vessel, care should be taken to avoid loss by evaporation, which will tend to cause crystallization of the syrup if not corrected by adding the lost moisture.

*Fluid Extract of Seneka.*—That which in the syrup produces only thickening and loss of transparency, occasions sometimes complete gelatinization in the more concentrated fluid extract,

especially if it be preserved by sugar. It will be necessary to employ a larger proportion of the alkaline carbonate, varying from two drachms to half an ounce for each pint of the fluid extract, proceeding in a similar manner to that for correcting the syrup as above. My friend, Charles Bullock, has tried this remedy for the gelatinized fluid extract with entire success. There is nothing in this addition therapeutically incompatible, yet it is possible that in extemporaneous mixtures chemical incompatibility may occur, but this the apothecary may guard against.

*Furley's albuminous coating for Pills.*—At the *Pharmaceutical Meeting* (held in London, Nov. 6th, 1861,) Mr. Furley of Edinburgh exhibited a process for rendering pills tasteless, by a coating of albumen, etc., which he had patented. The process is carried out in the following manner:—Two saucers are employed; the inner surface of one is coated with albumen prepared by well agitating the white of an egg; the other contains a fine powder, composed of equal parts of sugar and tragacanth. The pills to be coated are placed in the first saucer, and are made to revolve in it by a series of circular motions communicated by the hand whilst the saucer is held horizontally. This speedily coats them with a thin film of albumen, when they are quickly transferred to the other saucer, in which they are again caused to revolve and become coated with the powder of sugar and tragacanth. The peculiar tenacious consistence of the albumen tends to prevent the pills from getting a very thick coating, but it is sufficient, if continuous, to fix on their surface sufficient of the powder to form a thin but firm and tough coating when dry. The quantity of albumen to place in the saucer is soon learned by trial, and should not be in excess, lest the pills get too heavy a coating and thus dry too slowly. The ready solubility of the albuminous coating in the gastric juice is a great advantage in this agent. Mr. Furley requires of each pharmacist in Great Britain a fee of five dollars for a perpetual right to use his patent process.

*Colocynthin.*—Under this name there are several substances or preparations now to be found in some of the shops of Philadelphia. Some years ago, whilst on a visit to the Shakers of

New Lebanon, James Long, then the superintendent of their laboratory, showed me a resinous matter which he obtained from colocynth, and which he called colocynthin. I understood him to say that it was prepared from the tincture with hot concentrated alcohol, by evaporation to a syrup, and precipitated by water, as in the process for podophyllin.

Another preparation is a yellowish powder sold by Keith and Company of New York, under the same name.

A third form of this preparation was described by the pharmacist who had it as resinous alcoholic extract of colocynth pulp, without any pretence of its being the pure principle.

A fourth form of "colocynthin" is that prepared by Charles Shivers of Philadelphia, which has the appearance of a yellowish brown orange-colored resin in small glistening fragments, or in mass of a darker color. When in powder this preparation is straw-colored. It is exceedingly bitter, and entirely soluble in alcohol. Although a resinous body, the greatest part of this "colocynthin" is soluble in cold water, with repeated malaxation with water, leaving a putty-like resin undissolved, which is insoluble in water. The aqueous solution thus obtained is not precipitated by subacetate of lead, but at once by tannin, and hence this contains the colocynthin proper of Walz.

It is made by a process similar to Mr. Mouchon's (see *Amer. Jour. Pharm.*, vol. iv., 3rd series, page 167,) by passing alcohol through a mixture of powdered colocynth and animal charcoal, and evaporating the liquid to dryness. Mr. Shivers informs me that he obtains about three ounces from a pound of the powdered pulp, which is equivalent to five or six drachms from a pound of crude colocynth. Mr. Mouchon obtained only about four drachms, and describes it as an amorphous garnet-colored resinoid body—intensely bitter.

The most recent investigation of the constitution of colocynth pulp is by Walz, (see vol. vii. 1859, page 331 of this Journal,) who describes colocynthin as a golden-yellow amorphous substance, precipitable by tannic acid from a solution of that part of the alcoholic extract dissolved by cold water, after being freed from interfering matter by subacetate of lead; it is highly active—is a glucoside, decomposable by dilute sulphuric acid, and is insoluble in ether.

It is highly important, that in so active a substance as the active principle of colocynth, the nature of the substance employed should be well understood and not liable to vary. The pure principle of Walz requires too complicated a process, and, with the exception of Mouchon's article, made by Mr. Shivers, we are not well informed of the nature and mode of preparation.

It is, therefore, believed that apothecaries will do right to adopt Mouchon's colocynthin as an active, uniform, and easily obtainable representation of colocynth. Mr. Shivers informs me that in doses of two grains it has acted powerfully, and we believe in half-grain doses, associated with calomel and other agents, it is an effective aperient.

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#### GLEANINGS FROM FOREIGN JOURNALS.

*Purification of Amylic Alcohol.*—By M. Kirsch. (Neues Rep. fur Phar.) The oil of potato spirit (fusel oil) contains ordinarily 70 to 80 per cent. of amylic alcohol, and from 20 to 30 per cent. of alcohol. It is commonly purified by washing it first with water and afterwards distilling it, collecting the product only after the boiling point of amylic alcohol 269° F. is attained.

This process involves considerable loss, which the author avoids in the following manner: the crude oil is agitated with water saturated with salt; three or four operations appear sufficient for eliminating the greater part of the alcohol. It is then mixed with three or four times its volume of water, and distilled with a naked fire or steam, as in rectifying a volatile oil; the alcohol is all thus abstracted by the water from the amylic alcohol. The product consists of two liquids, the upper oily one being the amylic alcohol, which is separated mechanically by a funnel in the usual manner.—(Jour. de Pharm., Dec. 1861.)

*Manufacture of Quinine.*—M. Clark, suggests the preparation of quinia, by submitting cinchona to ebullition with water containing muriatic or sulphuric acid, then treating the decoction with an alkaline carbonate as long as it forms a precipitate, adding a small quantity of stearic acid, and boiling. The fat acid fuses and floats on the surface; little by little the quinia and cinchonia unite with it and form an insoluble soap whilst the precipitate blackens. When cool the stearate solidifies and is re-

moved, and boiled in pure water as long as the water is clouded, after which the stearate is treated with boiling acidulated water, which removes the alkaloids.

The hot solution having been carefully neutralized by an alkali, a brown matter is separated by filtration; when by cooling the whole becomes a magma of crystals of sulphate of quinia and cinchonia. These are separated by the ordinary process.

M. Clark asserts that the fatty soap contains all the quinia and cinchonia of the bark treated. He recommends this process also for opium.—(Jour. de Pharm., Dec. 1861.)

*On the Rotatory power of the Volatile and Fixed Oils.* By H. Buignet.—The author in an elaborate article on the application of certain physical means to pharmaceutical studies, (Jour. de Phar., Oct. 1861,) has subjected various bodies to the circular polarizing apparatus to ascertain their relationship to the polarized ray. After having prepared and carefully purified the following oils, they were examined:—

Essential oil of Orange	+	105.20	Essential oil of Cloves	0.00
“ “ Cedrat	+	88.88	“ “ Cinnamon	0.00
“ “ Caraway	+	87.33	“ “ (Chinese)	0.00
“ “ Citron	+	87.05	“ “ Sage	— 8.93
“ “ Chamomile	+	48.80	“ “ Thyme	— 11.23
“ “ Nutmegs	+	34.28	“ “ Peppermint	— 14.30
“ “ Penny Royal			“ “ (French)	— 14.79
“ “ (European)	+	25.47	“ “ Juniper	— 17.33
“ “ Petit Grain	+	20.47	“ “ Copaiba	— 21.20
“ “ Bergamot	+	18.45	“ “ Lavender	— 24.30
“ “ Rosemary	+	14.67	“ “ Flowers	— 34.29
“ “ Neroli	+	10.25	“ “ Yellow Sandal Wood	— 43.50
“ “ Fennel	+	8.13	“ “ Peppermint	— 34.29
“ “ Lavender			“ “ (English)	— 43.50
“ “ (Spike)	+	3.30	“ “ Turpentine	— 43.50
“ “ Sassafas	+	2.45		
“ “ Bitter Almonds		0.00		

In the table above, the numbers preceded by the plus mark + have a right-handed, or dextrogyrate, rotation; those with the minus mark, —, have a left-handed or lævogyrate rotation, whilst those without either are indifferent to the ray.

M. Buignet remarks, after examining these numbers; that nearly all of the oils possess a rotatory power; that the oils of the Aurantiacæ are all dextrogyrate, and mostly to a very high degree; that the oils of the Labiatæ have nearly all a left-handed rotation; that those of the umbelliferæ as tried, are dex-



trogryrate, and that the coniferous and allied oils rotate left-handed, thus showing that to a certain extent a relation exists between the rotatory power of oils in the same botanical group. Before, however, this property of oils can be turned to much account in judging of their identity or purity, it will necessary to collect a large number of accurate observations, yet M. Buignet has tried it in the case of neroli adulterated with *petit grain*, and chamomile mixed with turpentine, and got accurate results.

On submitting the fixed oils to the polarizing apparatus he found them all indifferent but three.

The oil of the liver of the ray,	. . .	— 0.20
“ “ “ squale,	. . .	— 6.82
Castor oil,	. . .	+ 3.68

The two first oils are so weakly negative that this property is of no use in their identification, but in regard to castor oil, it becomes a means of recognition. The author tried this oil prepared four ways, with and without heat, and found it all to possess this rotatory power to about an equal degree.

#### BERBERIN IN HYDRASTIS CANADENSIS.

By F. MAHLA, PH. D., CHICAGO.

*Hydrastis canadensis* L., commonly termed Orange root, or Yellow Puccoon, grows in rich woods from New York to Wisconsin and southward. It is a low perennial herb, which belongs to the natural family of the Ranunculaceæ. The root of this plant contains a large quantity of a yellow coloring matter, and its juice has indeed been used by the Indians to color their clothing yellow. It has been asserted also, that the Cherokees used to employ it for the cure of cancers and other diseases. In regular medical practice the root itself was but little used, until the so-called Eclectic and Botanic physicians began to employ it largely in their prescriptions. Of late even our regular physicians have begun to use an article, which was introduced by several parties under the false name of *hydrastin*. This so-called hydrastin is, as some experiments lead me to believe, not an isolated organic principle, but merely a desiccated alcoholic extract of the orange-root, and must accordingly be so denominated.

Hydrastis, however, contains an alkaloid and there are several methods mentioned by which it may be most conveniently extracted. The Eclectic Dispensatory gives one of those methods, according to which the powdered root should be extracted with alcohol. The tincture thus obtained is then evaporated, the residue mixed with water, the whole filtered and a quantity of hydrochloric acid added to the watery liquid, when a beautiful crystalline precipitate makes its appearance, which was *assumed to be the pure hydrastin*.

The circumstance, that this substance is precipitated from its solutions by a mineral acid, at the first glance makes its basic nature a little improbable. This circumstance combined with the fact, that an organic elementary analysis of this substance does not exist, seemed to make it desirable to have its properties a little better investigated.

In preparing the body in question, I followed in general the above given directions. I modified the process merely by effecting the extraction in a hot-water percolator so that the alcohol was always in boiling condition. I found that by this modification the process was finished in much shorter time, and that less quantities of alcohol were necessary. The crystalline body, formed by the addition of hydrochloric acid, was collected on a calico filter, pressed and redissolved in boiling alcohol. The hot filtered solution readily deposits on cooling such an amount of crystals, that the whole seems to form one solid mass. These crystals were again pressed and once more crystallized from alcohol, after which they were considered pure.

This substance forms, when dry, a light yellow powder, which presents under the microscope the appearance of prismatic crystals. It has a bright yellow color and a very intense bitter taste. It is inodorous and little soluble in cold water, to which it imparts, however, a deep yellow color. Cold alcohol dissolves also very little, but it is readily soluble and in large proportions both in boiling water and in alcohol. These hot solutions exhibit a brown-yellow tint, while the cold diluted solutions are purely yellow. Neither litmus nor curcuma paper is affected by them.

Concentrated sulphuric acid dissolves it with olive green color and disengages hydrochloric acid.

Concentrated nitric acid produces a deep red solution under disengagement of nitrous acid vapors.

It does not emit, any trace of ammonia, when boiled with a diluted solution of caustic potassa, but clots together and is transformed into a brown resinous substance, which adheres strongly to the sides of the vessel. This resinous body is insoluble in water but soluble in alcohol, to which it imparts a bitter taste.

Heated with soda-lime it emits ammonia.

Dry chlorine gas transforms it into a red body, which is readily soluble in water.

Polysulphide of ammonium, when mixed with a hot solution of this so-called hydrastin, produces immediately a red brown precipitate.

Sulphate of copper is precipitated with a yellowish green; nitrate of silver, chloride of zinc, corrosive sublimate, chlorate of potassa, and chloride of platinum with a yellow color. A solution of bichromate of potassa when mixed with a solution of this body throws down an orange-yellow, cyanide of potassium an ochre-yellow, and ferrocyanide of potassium a greenish-yellow precipitate.

When moderately heated it exhibits a deeper yellow tint; the original bright yellow color is, however, restored on cooling; if heated to a higher temperature it melts like a resin and leaves finally a light coaly residue.

All these reactions coincide so completely with the reactions of muriate of berberin, that I should not have hesitated a moment on this evidence alone to declare its identity with that alkaloid.

(The fact that berberin is precipitated from its solution by hydrochloric acid explains the peculiar method of preparation of hydrastin.)

To quiet, however, all doubts, I undertook an elementary analysis of it, which led to the following results:

1. The nitrogen was determined by Will and Varrentrapp's method. Before commencing the experiment, I dried the substance for 10 hours at a temperature of  $100^{\circ}$  C. The quantity of material employed amounted 0.416 grammes. It yielded 0.236 ammonia-chloride of platinum. This corresponds to 3.563 per cent. of nitrogen. Muriate of berberin at  $100^{\circ}$  C. requires 3.57 per cent.

2. The combustion for the determination of carbon and hydrogen was made with bichromate of lead.

0.440 substance dried at 100° C. yielded :—

Carbonic acid = 1.0450 which corresponds to carbon = 64.77 per ct.  
Water = 0.2035 “ “ hydrogen = 5.138 per ct.

Muriate of berberin dried at 100° C. requires in 100 parts 64.20 carbon and 4.841 hydrogen.

3. The quantity of chlorine was found by precipitating the boiling solution of the substance with nitrate of silver. This mixture was filtered when still quite hot, and washed on the filter with boiling water.

The material also in this instance was dried at a temperature of 100° C.

0.497 substance yielded 0.1725 chloride of silver ; this corresponds to 8.579 per cent. of chlorine.

Muriate of berberin requires 9.03 per cent. chlorine.

Berberin has been discovered thus far in different species of the Berberidæ and in one or two species of the Menispermæ. This occurrence was one of the principal arguments, with which the union of these two families in one under the name of *Cocculinæ* was justified.

It is, as far as I am aware, the first instance that this interesting body has been found in a plant, which belongs to the *Ranunculacæ*. This circumstance is, therefore, a proof, that even true alkaloids may occur in *several* plants which belong to *different* families.—*Amer. Jour. Sci. and Arts*, Jan. 1862.

[NOTE.—It is to be regretted that Dr. Mahla did not consult the paper of Mr. Alfred B. Durand, (see vol. 23d, page 113, of this Journal,) alluded to in the U. S. Dispensatory, who first isolated a distinct crystalline alkaloid from the *Hydrastis*. I have a sample of Mr. Durand's *hydrastin*, and it is not berberin, but crystallizes in light yellowish crystals of considerable size. The yellow coloring matter noticed by Mr. D. is probably berberin. As Mr. D. did not resort to precipitation by muriatic acid, he did not notice the peculiarity of its precipitation in yellow silky crystals. Mr. Merrill, of Cincinnati, who has recently sent a specimen of the same alkaloid, as that described by Durand, to this city, says it is quite distinct from the yellow crystalline *hydrastin*, as used by the Eclectics. We invite Dr. Mahla's attention to this subject.—*Editor Amer. Journ. Pharm.*]

## ON THE ORIGIN AND PROGRESS OF THE PHOSPHORUS AND MATCH MANUFACTURES.

By G. GORE.

(Continued from page 59.)

This wet and finely-divided substance having been dried, sifted, and packed in air-tight tins is ready for sale.

It is well known in modern chemistry that a substance may exist in two or more physical states, possessing very different physical and chemical properties, and that there may be as great a difference in the properties of the same substance in its different states of aggregation as there is between two chemically different substances. For instance, there is as great an amount of physical difference between carbon as it exists in the diamond and as it exists in pure lamp-black, as between copper and silver or silver and gold. The two kinds of phosphorus we have described are, then, precisely the same chemical substance, but in different states of aggregation. The following is a comparison of their properties. We will, for convenience, term them white and red phosphorus :—

<i>White.</i>	<i>Red.</i>
Poisonous.	Innocuous.
Evolves a strong odor.	Nearly odorless.
Phosphorescent—luminous in the dark.	Not phosphorescent—perfectly illuminous.
Melts at 108° F.	Melts at above 500° F.
Very transparent.	Opaque.
Almost colorless.	Varies in color from nearly black (with metallic lustre) to iron-gray, brick red, crimson, and scarlet.
Freely soluble in various liquids.	Nearly insoluble in all liquids.
Distinctly crystalline.	Destitute of all crystalline structure (amorphous).
Soft, may be indented by the nail.	Hard as a common red brick.
Flexible as copper or lead.	Brittle as glass.
The great and most conspicuous fact is that red phosphorus	

may be kept in the dry state, exposed to the air, without inflaming; whilst the ordinary variety, under the same circumstances quickly ignites. The minutest quantity of ordinary phosphorus in the red or amorphous variety can be detected by digesting the latter, in the state of powder, in bisulphide of carbon, and then letting fall a single drop of the clear liquid upon a saucer floating upon boiling water in a dark place; luminosity will immediately appear if white phosphorus is present.

There are several uses to which phosphorus has been applied, but, as far as quantity is concerned, almost the only important application is in the manufacture of lucifer matches. It is remarkable that, although the property of phosphorus of igniting by friction was known soon after its discovery, it was not until about the year 1833, that it was successfully applied to the manufacture of matches. It was then sold wholesale at four guineas a pound; in 1837, at two guineas; and at the present time, at less than half a-crown. Manufactories of it exist in Great Britain, France (Lyons), Bavaria, Baden, Austria, and Sardinia.

Since the commencement of the manufacture of phosphorus upon a large scale in England, in 1845, the value of phosphorus imported into this country has regularly and rapidly decreased. According to the reports of the Great Exhibition of 1851, the value of phosphorus imported from all parts into Great Britain in 1844 was 2567*l.*, and in 1850 only 3*l.* And since that period it has become an article of constant export to the Continent and other parts, the proportion consumed in the United Kingdom being comparatively small. In his "Catechism of Agricultural Chemistry," Professor Johnson states that 200,000 lbs. of phosphorus are consumed in London alone per annum. Persons conversant with the actual consumption know that at that time, and probably at the present hour, it would not exceed 20,000 lbs.

It is also stated in a recent publication on Chemistry, by Professor Muspratt, (article "Phosphorus," p. 680,) that phosphorus "is prepared as an article of manufacture in large quantity in London and Paris. Kane has calculated that in the latter city alone about 200,000 lbs. are yearly produced." There may have been once a very small production in London and Paris, but it has long since entirely ceased. The enormous consumption of fuel necessitates that, for economic production, the manufac-

tory be placed where coal is cheaply obtained ; and the quantity of phosphorus produced in all France, at the date of Dr. Kane's book, is not likely to have been at all more than 20,000 lbs. It is plain that, by mistake, a cypher too many has been added.

Reserving a few remarks upon the importance of the labors of Brandt, Boyle and others who investigated phosphorus, until the close of this article, I will now give a brief account of the gradual development and present condition of the lucifer match manufacture.

The earliest recorded means of obtaining a light appears to have been by means of rubbing together two dry sticks. A hole having been made, by means of a sharp stone, in a dry piece of wood, and, by the same means, a piece of stick of different wood—laurel with ivy for instance—having been cut to a point at one end, the sharp point was inserted in the hollow, and rapid rotation imparted to it by means of the hands, similar to the motion of a chocolate stirrer, until, in a few minutes, the friction of the point generated sparks, from which fire was obtained. Sulphured matches also are of very ancient origin.

The next method—that of the common flint and steel—was in use for centuries, and can even now be remembered by every adult person. It consisted in striking the edge of a small piece of flint against the edge of a rod of iron or hardened steel, in such a direction that the sparks which occurred fell upon pieces of tinder (charred linen), contained in a shallow tin vessel, and ignited them. By gently blowing the ignited tinder, the combustion spread and became sufficient to inflame a sulphured match. If the tinder was at all damp, it failed to ignite.

The discovery of phosphorus in 1669, with its luminous and igniting properties, at once indicated the possibility of using it to obtain a light ; but no successful experiments of the kind at that period have been recorded. It was not until 1833 that it was successfully applied. In the mean time, a number of inventions for obtaining a light, some involving the use of phosphorus, and others not, were adopted to a limited extent. Phosphoric tapers, consisting of ordinary wax tapers, with their wicks coated with phosphorus, and enclosed in air-tight glass tubes, were for some time in use. To obtain a light with them

the end of the glass tube was broken off, and the phosphorus now exposed to the air, oxidised quickly and inflamed.

The next plan consisted of a well-corked bottle, coated internally with phosphorus: a sulphur match was introduced into it, and a little of the phosphorus adhering to the top of the match, caused the sulphur to inflame on coming into contact with the air. If it failed to ignite, the action was assisted by rubbing the match upon the cork of the bottle.

Homberg's pyrophorus, or fire-bearer, consisted of a dried and roasted mixture of three parts of alum and two parts of flour or sugar contained in a well closed bottle. A little of this powder exposed to the air upon cotton wool ignited the cotton. This mixture contained no phosphorus. There were several other mixtures of a similar kind by Gay Lussac, Dr. Hare, and others, but they were only used by the curious and scientific.

The "inflammable air-lamp" of Volta consisted of a stout glass vessel containing zinc and diluted oil of vitriol. Hydrogen gas was generated by these substances, and on turning a cock the issuing jet of gas was ignited by an ingenious contrivance, consisting of an electrophorus, which passed an electric spark through it at the moment.

The "light syringe" consisted of a vertical brass cylinder and piston, with a small piece of tinder placed inside at the bottom and closed end. On compressing the piston very rapidly and with great force, heat was evolved by the condensation of the air and ignited the tinder, which was then removed by various contrivances.

In 1804, a little bottle, containing a mixture of phosphorus, oil, and wax came into use. A sulphur match was dipped into the composition and then ignited by rubbing it upon the cork of the bottle. This was succeeded by a similar bottle of composition, with matches tipped with a mixture of sulphur and chlorate of potash.

In 1807, the "chemical matches," composed of sulphur matches tipped with a mixture of chlorate of potash, sugar, gum, vermillion, and sometimes camphor, were invented. They were ignited by dipping them into a bottle containing abestos fibre moistened with sulphuric acid.

About the year 1820, Döberiener discovered that finely-divided



platinum has the property of causing a mixture of oxygen and hydrogen gases to unite and inflame, and invented his well-known hydrogen lamp. This consisted of an apparatus somewhat similar to Volta's for generating hydrogen by means of zinc and diluted sulphuric acid in a strong glass vessel. On turning a small tap a jet of the gas issued forth and impinged upon a small ball of the platinum powder which immediately became red hot and ignited it; from this a taper was lighted. By a peculiar mechanical contrivance in this apparatus, when the gas issued from the orifice, the acid and water came in contact with the zinc and generated a fresh supply of gas; and as soon as the tap was closed and a sufficient stock of the gas was produced, the liquid was expelled by the gas from contact with the zinc, and the generation of gas ceased.

In 1826 "lucifers," or light-bearing matches, were invented. They consisted of ordinary sulphur matches, tipped with a composition of chlorate of potash and sulphuret of antimony, and were ignited by drawing them briskly between folded glass paper.

The defect of these was that they required a considerable effort to ignite them, and the composition was apt to be torn off by the violence of the friction.

These were succeeded in 1828 by the "Prometheans," consisting of a small roll of gummed paper, containing at one end a dried paste of sugar, chlorate of potash, gum, and water, together with a small bulb of glass containing oil of vitriol. They were ignited by means of a small pair of pliers supplied with the box of matches.

In 1830, bottles, containing a mixture of one part of manganese and two parts of phosphorus, were patented for producing a light. Into these bottles common sulphur matches were dipped, and ignited by oxidation of the phosphorus on exposure to the air.

All these inventions failed to supersede the old tinder-box with its flint and steel, chiefly on account of their greater expense, but also on account of their dangerous and uncertain action.

About the year 1833 phosphorus was at last successfully introduced into match composition, and from that period the tinder-box rapidly declined in use, and the new matches became a successful and extensive branch of manufacture.

The phosphorus match did not, however, at once acquire the degree of perfection it now possesses. A variety of substances were tried in the preparation of the match-splints and in the composition of the inflammable paste: vegetable wax, bees' wax, sulphur, stearine, oil, and fat to make the wood ignite; glue, gum, and sugar to make the mixture adhere; chlorate of potash, saltpetre, sulphur, sulphuret of antimony, antimonial saffron, red lead, and peroxide of manganese to increase the combustibility; powders of charcoal, cork, pitch, resin, magnesia, lime, or chalk, to make the composition more porous; powdered glass, sand, or emery, to increase the friction; and vermilion, red lead, red ochre, prussian blue, smalts, ultramarine or chromate of lead, as a coloring matter, and to disguise the other ingredients.

The following is the general process of manufacture of matches as now in use:—The wooden splints for the matches are prepared from the very best quality of pine planks, perfectly desiccated at a temperature of 400° Fah. Each plank is cut into about thirty blocks about eleven inches long, four and a half inches wide, and three inches thick. A block is fixed with its small end downwards between two uprights, the grain of the wood being horizontal. A frame, having fixed upon its upper surface about thirty lancets one-eighth of an inch asunder, with their points projecting upwards one-eighth of an inch, reciprocates to and fro beneath the end of the block of wood by means of a crank, and in doing so scores the whole of the lower surface of the block with a number of parallel cuts, about one-eighth of an inch apart and one-eighth of an inch deep, in the direction of its fibres. Immediately upon this a sharp blade, or scythe, swings round horizontally beneath, and cuts off the scored surface to the thickness of one-eighth of an inch, in the form of square splints four and a-half inches long, which fall through a shoot into a room beneath. The block now sinks one eighth of an inch and the operation is repeated. In this way between two and three millions of splints are readily formed by steam power in a single day. English splints are of two sizes—large and minikins: the larger ones are two and a quarter inches long (or double-length, as first formed, i.e. four and a-half inches), and the minikins are rather shorter.

In England the splints are square in form, and produced as above; but in Germany they are cylindrical, and are prepared in this shape by placing the small block of wood with the ends of its fibres downwards upon a strong plate of steel of larger surface perforated over the greater part of its surface with holes of the size of the splint, countersunk at their entrances to form cutting edges, and as close together as possible. Great pressure being now applied to the upper end of the block, it is forced through all the holes, and reappears on the lower side of the steel plate in the form of a heap of cylindrical splints.

Returning to the English splints: they are collected as they are cut, and measured into bundles of six dozen each by a man who seizes a number of them in his hands from the loose and irregular heap, and by dexterous jerking, knocking, and shaking, arranges them parallel to each other, then places them in a short open gutter or cradle, across which he has previously thrown a piece of string, and when the measure is full to the level of its edges he ties up the bundle, throws it aside, and proceeds with another with equal rapidity. The bundles are then perfectly dried by exposure for several hours in a heated oven.

The bundles of splints are next coated at both ends with sulphur. A quantity of brimstone is melted in an iron pot, and one end of a bundle being quite scorched by contact with a red-hot plate is immersed into the melted sulphur to the requisite depth; then repeatedly swung in the air, to throw off the superfluous sulphur, and rolled violently upon its axis and beaten, to prevent the splints adhering together in one mass as the sulphur hardens. The other end is then similarly treated. In some cases the ends of the splints are saturated with wax instead of sulphur in a similar manner.

A child now arranges the splints in a number of successive rows, one above another, in a frame, each splint separate from the others, in the following manner:—He takes a narrow, wooden frame composed of three fixed pieces, a narrow bottom cross piece about sixteen inches long and two inches wide, with two vertical pegs about eight inches high, one at each end; and has by his side about two dozen loose strips of wood of similar length and width to the bottom piece, and with holes or notches at their ends to receive the upright pegs; each of these strips

has a series of fifty transverse, shallow notches upon its upper surface to receive fifty splints, and is covered on its lower side with felt or other soft material. Having placed one of these strips upon the bottom piece, he takes up a handful of splints and quickly deposits fifty of them, one in each groove, their ends projecting one and a quarter inches on each side; he then places another strip upon the first one, and fills it in like manner, and so on until the pile of twenty-four rows is complete. A thicker strip of wood, similar to the bottom piece, covered upon its lower side with felt, is then placed upon the top, and the whole secured moderately tight by means of thumb-screws, or pegs fitting into holes in the uprights. The splints are then ready for being tipped at their ends with the phosphorous composition. Many children are employed at this kind of labor.

The exact ingredients, and their proportions, in the phosphorous composition, differ in different countries and with different manufacturers, but they all consist essentially of emulsions or mixtures of phosphorus in a solution of glue or gum arabic, with or without other matters for increasing the combustibility, for coloring, &c. In England the composition contains a considerable quantity of chlorate of potash, which imparts a snapping quality, and noisy projecting flames, and but little phosphorus, on account of the moisture of the climate; other substances are also added to give brilliancy and power of resisting moisture. The following is about the composition of the best quality:—

Water . . .	4	parts by weight.	
Glue . . .	2	"	"
Phosphorus . .	1½ to 2	"	"
Chlorate of potash	4 to 5	"	"
Powdered glass .	8 to 4	"	"

In Germany the proportion of phosphorus used is much larger, and gum is used instead of glue, together with nitrate or protoxide of lead, and no chlorate of potash. In consequence of the presence of so much phosphorus and the absence of chlorate of potash, the German matches light quietly, with a mild, lambent flame, and are injured quickly in a damp place by the oxidation of the phosphorus and the production of

phosphoric acid, which attracts moisture. One of their mixtures, given by Böttger, is composed as follows:—

Phosphorus . . .	4	parts by weight.
Nitrate of potash . .	10	“ “
Fine glue . . .	6	“ “
Red ochre . . .	5	“ “
Smalt . . .	2	“ “

In every case the glue is first broken into small pieces and soaked in cold water until quite soft, then added to the requisite quantity of water and heat applied by means of a water-bath until it is quite fluid, and at a temperature of 200° to 212° F. The vessel is then removed from the fire, the phosphorus gradually added, and the mixture agitated briskly and continually with a stirrer, having wooden pegs or bristles projecting at its lower end. The chlorate of potash, coloring, and other matters, all in a state of very fine powder, are then added, one at a time, to prevent risk of accident, and the stirring continued until the mixture is comparatively cool. By this means the minute particles of phosphorus are kept from uniting into large globules, and the heavier matters are prevented from sinking to the bottom.

In the process of tipping the ends of the matches (termed in the manufactory “dipping”), a quantity of the composition is spread, by means of a large palette-knife, upon the horizontal surface of a smooth stone or plate of iron, heated by means of steam beneath. The mixture becomes much more fluid by the heat, and is spread to a width and length of about ten inches by twenty, and a uniform depth of about one-eighth of an inch by means of a horizontal gauge. The “dipper” then takes a frame filled with splints, as already described, strikes the ends of the splints upon a bare part of the stone until the whole of those ends exhibit a flat, uniform surface. He then dips those ends, either once, twice, or more times, into the mixture, until they have all received a proper amount, and hands the frame to a boy, who places it upon a rack in a current of air, in order that the composition may cool and harden. Meanwhile the dipper proceeds with other frames in like manner, and replenishes the layer of composition occasionally. After a number of frames have been thus dipped, and the composition

upon the splints in them has partly hardened, they are all taken, one by one, in the original order, and the other ends of the splints tipped in a similar manner. With six dipping-stones, half-a-dozen workmen have dipped as many as twenty millions of matches in a single day. This method of dipping is termed "frame-dip;" but there is another process called "bundle-dip," which consists in taking a bundle of the sulphured splints, and twisting it in such a manner that the ends of the splints spread out like a brush and separate from each other; they are then tipped with composition like the others. In this process the *ends* only of the splints acquire a coating of the mixture, whereas in frame dipping the composition extends a short distance up the *sides* of the splints and is more firmly attached. Bundle-dipped matches are inferior to frame-dipped ones.

In the manufacture as now being described it will be observed that each splint is  $4\frac{1}{2}$  inches long, coated with composition at both ends, and will therefore form two matches by being cut asunder in the middle; but this is not always the mode of proceeding; in some manufactories the splints are cut in two before being dipped, and are tipped at one end only.

As soon as the composition is partly dry, and of such a degree of hardness as to bear the next operation without igniting and without rubbing off, the splints (those coated at both ends) are quickly removed from the frames into parallel heaps, and the frames set at liberty. A man now takes a heap of fifty of the splints, places them between two vertical supports in a horizontal channel or trough of wood, passes a string with a weight over them to prevent their falling about, and cuts them through at their middle by means of a cork-cutter's knife, moving upon a hinge like a chaff-cutter's scythe. He then places them in heaps of 100 matches each, ready for boxing. The little boxes are now filled by women and children, who perform the operation with exceeding rapidity, and before the matches are dry, in order to avoid accidents. Each match passes through the hands of about seventeen persons, chiefly children, in its process of manufacture.

Trays of sawdust are placed near the various workmen and operators to plunge the matches into in case they ignite.

Vessels of water are also freely at hand in case of accident. Also a quantity of sand is strewed in a layer of several inches deep beneath the racks upon which the frames of matches are set to harden, so that in case of a frame of matches falling, the flames may be quickly extinguished. A lotion, composed of olive oil and lime water, is exceedingly useful to apply to the skin in cases of burning by phosphorus.

(To be continued.)

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#### ABSORBING POWER OF THE ROOTS OF PLANTS.

By DR. JESSEN.

Dr. Daubeny has established that different species of plants, growing in the same soil, take up therefrom different foods, and certain minerals in different proportions. This selection, it will be said, is made through "vital force,"—a convenient phrase for hiding anything that you cannot or have not inquired into. If we went down to the elementary composition of the human body, the term might be defined as meaning the formation and combination of cells. In this sense it corresponds with, and has comparatively the same range as the term "crystallizing force," as regards minerals. The force which puts together crystals, and that which puts together cells, and forms them into living bodies, is equally an unknown force; we use for each the term mentioned. Taking "vital force" to mean the formation and combination of cells, the secretive power of plants was thence to be explained. Some ancient philosophers held that plants desired and selected food nearly in the same way as animals. That opinion was long ago given up; but where is the difference between animals and plants? Men and animals move to food that they want; plants grow for it. This was a point too often overlooked. But animals can move away or cease to take food when satisfied; plants advance their roots amongst their food, and they cannot use the same parts of the same root for obtaining that root a second time. They have, so to speak, to throw out new fibres every time they want food. A sound rootlet took up fluid, whether nutritive or not, in a manner different from an injured one; and many physiologists, and nearly all chemists, have experimented on wounded plants, without knowing it, owing to the delicate handling which rootlets require. The absorption goes on

by endosmosis through the bark cells. Dr. Grahame says that by every such process the membrane of these cells is thinned and dissolved; that the endosmosis is different for every different membrane; and that the force of endosmosis is altered not only by the different nature of the substances going into the cell, but also by the nature of the sap in the cell itself.

The author considers these facts, as made out by Mr. Grahame, to be the starting point of a new era in the physiology of nutrition. No one has yet taken up the matter and pointed out the uses of these discoveries, and it was sufficient at present that Dr. Grahame shows that any slight difference in the composition of a membrane, or of the contents of a cell, will be sufficient cause for a decided difference in the nature of the food introduced into it. The point of a rootlet is of very different structure from its upper part. It serves only for the growing out of the rootlet, whose cells are formed in the upper part. Many of the cells run into short hollow hairs, which, like the cells, have a very thin membrane. The fluid taken in by the rootlet, after a time destroys the outer layer of cells, and the second layer comes into play, but the constant production of new cells in the interior causes the rootlet to increase in size. Passing from cell to cell the fluid becomes changed into sap; but the sap differs in every cell, and each cell around one well filled gets out of it a different kind of food. The author contends that it is not possible to get into a plant anything that is a poison to it. The result will be, if poisonous matter is present, that the outer layer of cells will be destroyed, succeeding layers presenting themselves, and also being destroyed so long as the poison exists around. If the poison gets into the outer cells before they are wholly destroyed, it will not be taken up so readily as a nutritious liquid; and in any case, after traversing a few rows of cells, all poison will be retained, whilst other portions of the plant will remain uninjured.—*Proceedings of the Brit. Assoc. at Manchester, Sept. 1861.*

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#### QUICKSILVER.

The magnitude of our Quicksilver export the present year is calculated to attract attention. Not only has there been an entire recovery of that trade from the low ebb it had reached under



the legal embarrassments which, in 1858, were placed on the production of a leading mine, but the prospect is fair that we shall largely exceed in the exportation of this metal the present year any preceding year in our history. Indeed, we have already run ahead of 1857, our largest previous export year, by 2,586 flasks, and the demand is steadily increasing, the increased requirement being large in the direction of Mexico, which country at this time is our second best customer, China being first on the list. The following have been our exports and the value thereof, from January 1st, present year, to date :

To	Flasks.	Value.
China.....	14,588	\$469,498 00
Mexico.....	7,632	236,732 20
England.....	2,000	60,030 00
Peru.....	1,808	58,232 50
Chili.....	1,559	49,920 00
Australia.....	1,350	45,850 00
New York.....	625	23,265 00
Central America.....	132	4,193 20
Vancouver Island.....	104	3,328 38
Japan.....	50	1,500 00
Total.....	29,848	\$952,519 28

It may be regarded as not a little singular that quicksilver producing countries are among our best customers for this metal. China, Mexico, and Central and South America, all produce the article, but through lack of energy or skill in its production, are forced to depend on imports. Its large consumption in China is mainly in the manufacture of vermilion. In Mexico, Central America, &c., we need scarcely state that its sole employment is as an amalgamator of the precious metals.

At present, as far as we can learn, nearly all our mines are in active course of development. The New Almaden, the New Idria, the Enriqueta, and others, are turning out the metal in unwonted abundance, while from the north we hear that the interesting Geyser discoveries are about being worked on a scale commensurate with the high expectations entertained for them. What effect this increased production may exert on prices remains to be seen.—*Alta Californian*.

#### EFFERVESCENT CARBONATE OF IRON.

In the last number of the *Chemist and Druggist* we noticed some very well made effervescing Chalybeates. As some of our

readers are anxious to know the exact mode of forming these elegant aperients, we insert Dr. T. Skinner's formula for this preparation.

R Acid. Tart., ℥ij.  
Sod. Bicarb., ℥v.  
Ferri Sulphas., ʒx.  
Pulv. Sacch. Alb., ʒi. ʒvi.  
Acid. Citric, ʒij.

First. Mix the sulphate of iron with the sugar, and part of the tartaric acid.

Secondly. Mix the citric acid with the remainder of the tartaric acid, and bicarbonate.

Thirdly. Stir the two mixtures together, and thoroughly unite them by sifting.

Lastly. Put the whole into an open metal vessel in a water bath, and stir until it is well granulated. In these proportions there are ten grains of sulphate of iron in every drachm and a half; this will produce, by double decomposition, four grains of pure protocarbonate of iron.

It is also needless to observe that the materials employed should be finely powdered, very dry, and that the preparation should be kept from the air and moisture by being preserved in well-stopped bottles.

We believe that the more frequent employment of remedies of an elegant and unobjectionable form is of more importance than is frequently imagined—a patient often refusing to take nauseous though perhaps important medicines who would readily take the same remedies in a less objectionable form; hence we are always glad to notice any improvement, having for its object the rendering of medicaments less obnoxious to the palate. Under this class of improvements we may rank the two extremely elegant compounds named at the head of this notice; they are white granular solids, rapidly dissolving in water with brisk and lively effervescence, and furnishing clean, transparent, colorless solutions of a really pleasant and tonic taste.

The more simple contains one grain of citrate of quinine to each dram, and the other possesses, in addition, two grains of citrate of iron.

The preparations are obviously very carefully made, and are

stated to retain their properties unchanged for any length of time if kept from access of moisture. To a convalescent, requiring the continued use of either iron or quinine, we can hardly imagine a greater boon than these will prove themselves to be, as, whilst retaining all the potency of the drugs, they are as pleasant as a glass of soda water.—*Chemist and Druggist*, Nov. 15, 1861.

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#### ON THE TENACITY OF METALLIC COBALT.

The quite recent discovery of the exceeding tenacity of metallic cobalt, *which is double that of iron*, promises to place this metal in the first rank of mechanical utility. Oxygen being cheaply attainable, its ores will, in all probability, be smelted, and the metal produced in large quantities; and should a cobalt steel exist, bearing similar relation in its qualities to those which ordinary steel bears to iron, there seems no limit to the improvement of our tools, engines and every fabric in which lightness and strength have to be combined.—(Note to Sir John F. W. Herschell's treatise on Physical Geography, bearing date April, 1861.)

In order to appreciate the importance of this discovery, it must be borne in mind that iron has been heretofore regarded as the most tenacious of the metals, and that copper, which ranks next to it, has but half its tenacity.—D. B. S.

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#### ON SOME APPLICATIONS OF CARBOLIC ACID, OR HYDRATE OF OXIDE OF PHENYLE.

By DR. F. CRACE CALVERT, F. R. S.

Although carbolic acid has long been known to possess powerful antiseptic properties, its use has been delayed in medicine owing to the difficulty experienced in obtaining it in considerable quantities and in a state of purity, as well as to the caution required in introducing new substances in that branch of science. The success, however, which has lately attended its application, will tend greatly to increase its importance as a therapeutic agent. It has been used with marked advantage in the Man-

chester Royal Infirmary by several of its distinguished physicians and surgeons. Thus, Dr. Henry Browne has given it in solution in water in cases of chronic diarrhoea with very satisfactory results. Dr. Roberts has applied it with very great success in the dose of one drop, in cases of vomiting, even after creosote had failed; he has also found it beneficial in cases of vomiting from dyspepsia, which disease is especially marked by pain after food. Mr. J. A. Ransome has used it for ulcers and other offensive discharges. Mr. Thomas Turner, in a note which he has communicated to me, speaks of carbolic acid in the following terms:—

“It may be advantageously used as a solution of one part of acid in seven parts of water, in foetid ill-conditioned ulcers. It alters the action of the blood-vessels causing a purulent instead of a sanious discharge, and destroys almost immediately the offensive smell of the secretion. The ulcers having a communication with carious bone, or even necrosis (where the bone is dead,) it has in its diluted state a good effect when injected into the sinuses leading to the diseased bones. When there is mere caries or ulceration of the bone it effects the healing process, and in necrosis it promotes the exfoliation of the dead portion. \* \* In gangrenous and all offensive sores it removes all disagreeable smell and putrescency, and may render the discharge innocuous to the contiguous living and unaffected tissues. In its diluted state, therefore, it is a great boon to patients laboring under that class of disease.”

Mr. Heath, house-surgeon of the infirmary, has used it with two parts of water as a lotion in sloughing wounds, and has found that in a short time after its application, it entirely arrests the sloughing process, and produces a healthy appearance.

Dr. Whitehead has used with advantage Dr. Robert Angus Smith's solution of sulphites and carbonates of lime and magnesia.

In July, 1859, M. Velpeau drew the attention of the French Academy of Sciences to the value of the mixture of coal-tar and sulphate of lime of MM. Corne and Demeaux in the healing of ulcers and other offensive wounds, and it may be added, that this mixture was used with great advantage in the French army after the great battles of Magenta and Solferino.

In the following month I forwarded a note to the French

Academy, pointing out that from experiments I had made with the various substances existing in coal-tar, it was highly probable that carbolic acid was the active agent of the coal-tar used by MM. Corne and Demaux, and that much more certainty might be expected if that acid were substituted in their mixture, for the composition of coal-tar varies according to the nature of the coal, and the temperature employed in its preparation. I also suggested that it was probable that the powerful antiseptic properties of carbolic acid prevented the decomposition of the adjacent parts, and thus tended to restore the wounds to a healthy state, and to remove the cause of infection. Before quitting this part of the subject, I beg again to call attention to a fact which I have already published in one of my papers, namely, that the addition of two or three drops of this acid to a pint of freshly made urine, will preserve it from fermentation or any marked chemical change for several weeks.

I have also applied it lately to foot rot, which annually carries off large numbers of sheep, and I have been given to understand that the remedies hitherto adopted in this disease have been only partially successful. I think that if my experiments are further confirmed, it will prove a great boon to the farmers of this country.

This acid has also been applied by me during the last twelve months to the preservation of gelatine solutions and preparations, of size made with starch, flour, and similar substances, and of skins, hides, and other animal substances. In fact, its antiseptic powers are so great, that it is the most powerful preventive of putrefaction with which I am acquainted. It appears also to act strongly as an antiferment, for I have proved on an extensive commercial scale, that it prevents (as stated by me in a paper published in 1855) the conversion of tannin into gallic acid and sugar. It also arrests lactic fermentation. I am now engaged in a series of experiments to discover if that power extends to alcoholic, butyric, and acetic fermentations. I hope also to communicate to you shortly the results of my experiments on the protection of timber from dry rot.—*London Pharm. Jour.*, Dec. 1861.

## RESEARCHES ON HYPOPHOSPHITE OF LIME,

BY M. GERARD JANSSEN.

1. *Preparation.*

The hypophosphites are seldom met with chemically pure; this is due to those terrible explosions to which the most skilful operator exposes himself in their preparation; prompted by a well-grounded fear, he dares not conduct the process to the end, and the product obtained is more or less altered by foreign substances.

The properties attributed to such preparations cannot be those of the hypophosphites chemically pure. The author of these researches sought a new method of preparation, which would permit of obtaining these salts perfectly pure and without danger.

He first investigated the causes of explosion; these he found to be due to—1st, the action of heat, and the oxygen of the air on the phosphuretted hydrogen ( $P H_3$ ); 2nd, the production of biphosphuretted hydrogen ( $P_2 H$ ); 3rd, the formation of a peculiar and very explosive compound, to which he gives the name of triphosphuretted bi-hydride ( $P_3 H_2$ ). This substance crystallizes in hexagonal prisms. As long as the temperature of the mixture remains constant, there is no fear of explosion, but if after the heat has decreased it be then raised, the triphosphuretted bi-hydride is instantly decomposed into phosphorous and phosphuretted bi-hydride ( $P H_2$ ), which takes fire spontaneously. Alcohol is the only compound which prevents these explosions, because it not only arrests the action of the oxygen of the air on the phosphuretted hydrogen and the production of biphosphuretted hydrogen, but also, what is more important, the formation of phosphuretted bi-hydride.

To prepare the hypophosphite of lime, which may be taken as a type of these salts, a sufficient quantity of hydrate of lime is mixed with three times its weight of distilled water, to which a third of pure alcohol has been added. The mixture is introduced into a long-necked flask heated gently in a sand-bath. When the mixture has attained a temperature of  $50^{\circ}$  to  $60^{\circ}$  Cent., small pieces of phosphorous are gradually added, until the action has entirely ceased. The apparatus is allowed to cool, and the solution filtered through asbestos. The filtered liquid is

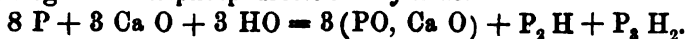
freed from alcohol by distillation in a retort, the residual solution evaporated to perfect dryness, and the white powder thus obtained preserved in well-stoppered glass bottles.

The hypophosphite may be crystallized in the retort by a slow evaporation.

The action of the alcohol is thus explained: the phosphorus acting on the hydrate of lime by heat gives hypophosphite of lime and phosphuretted hydrogen.



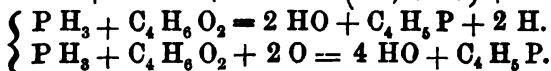
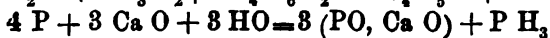
Two intermediate compounds are also formed: biphosphuretted hydrogen and triphosphuretted bi-hydride.



The alcohol decomposes these two compounds, forming phosphide of ethyl.\*

This again is decomposed by the base into hypophosphite and alcohol, a part, however, remaining mixed with the alcohol recovered by distillation; this may serve for a subsequent preparation.

The action terminates by a feeble evolution of hydrogen, from the decomposition of the phosphuretted hydrogen; one part becoming combined during the operation with the oxygen of the air, forming water.



## 2. Properties.

Hypophosphite of lime is a white powder, inodorous, but of an acrid and burning taste. Deliquescent and very soluble in

\* The phosphide of ethyl when separated from the alcohol, is a limpid fluid of a phosphuretted odor and burning taste. It is very volatile, burning at 90° Cent. It is soluble in alcohol; the solution has an opaline appearance. In water it separates in drops like chloroform, which it also resembles in its anæsthetic properties. It burns with an emerald green flame, exhaling an intensely disagreeable odor. A little powdered tin, bismuth, or antimony, placed in the flame, causes the color to pass to pale violet, and finally to pure white. The great danger which attends the preparation and manipulation of this substance, has not yet permitted the author to study all its properties.

water, scarcely soluble in ether and absolute alcohol. Soluble in fixed and volatile oils, it is precipitated when they become rancid. It crystallizes with difficulty; the crystals contain two equivalents of water ( $\text{PO}$ ,  $\text{CaO}$ ,  $2 \text{HO}$ .) Its solution, exposed to the air, is transformed into carbonate and biphosphate of lime. Oxygen converts it first into phosphite and then into phosphate. It immediately decolorizes a solution of sesquisulphate of manganese ( $\text{Mn}_2 \text{O}_3$ ,  $3 \text{SO}_3$ ).

Sulphur, selenium, and tellurium, also decompose it into phosphite, then into phosphate, with formation of sulphide, selenide, or telluride of calcium.

Boron, silicon, and carbon decompose it by heat, borate, silicate, or carbonate of lime is formed, and phosphorus evolved in vapor.

Hydrogen decomposes it into phosphate and phosphuretted hydrogen.

Hydrochloric, hydriodic, hydrobromic, and hydrofluoric acids decompose it into phosphate, phosphuretted hydrogen, and a haloid salt.

Nitric acid converts it into phosphate, hyponitric acid being evolved.

The alkaline bases decompose it into phosphate and phosphide.

The alkaline carbonates when boiling, and the alkaline sulphates in the cold, transform it into an alkaline hypophosphite, and carbonate or sulphate of lime.

It precipitates metallic gold from its solutions.

In a solution of nitrate of silver it produces a white precipitate, which rapidly turns brown; if the hypophosphite be added in excess in the cold, it reduces the silver to the metallic state after some time; by the aid of heat the reduction is more rapid.

In a dilute solution of bichloride of mercury it produces a crystalline precipitate of chloride. If added in excess, it reduces the mercury to the metallic state.

From a solution of sulphate of copper it precipitates the oxide, which a continued ebullition reduces to the metallic state.

### 3. *Adulterations.*

Hypophosphite of lime may contain phosphite, phosphate, or carbonate of lime.

These three adulterations are separated by cold distilled water, in which they are insoluble.



The first gives off hyponitric acid, when acted on by concentrated nitric acid; the second calcined with a soluble salt of lead, gives globules which crystallize in regular polyhedrons; and the third gives off carbonic acid when treated with a strong acid.

It may also be adulterated with chloride of sodium, sulphate of lime, carbonate of magnesia, and oxide of zinc; these can be recognized by their usual tests.—*Lond. Pharm. Jour.*, Dec. 1861, from *Repertoire de Chimie*.

#### ANALYSIS OF THE BARK OF ATHEROSPERMA MOSCHATUM, MONIMIACEÆ.

By N. J. ZEYER.

The author obtained this Australian drug from Dr. F. Müller, of Melbourne, and analysed it under the supervision of Professor Wittstein. Dr. O. Berg has published two years ago the following description in *Archiv der Pharm.* xcix. 151. It occurs in hard, heavy bent or quilled pieces, one and a half to three lines in thickness, and of different length and breadth. Externally it is of a dirty greyish brown, partly spotted with whitish lichens and with predominating serpentine longitudinal ridges, the central line of which is split. The fracture is uneven granular pale brown; the inner surface appears to the naked eye even, darker brown, finely striate. Berg describes the odor and taste strongly nutmeg-like, the author finds that both remind also somewhat of sassafras; the specific name *moschatum* must certainly not be interpreted as resembling musk.

One-eighth of a pound was successively treated with ether, alcohol, water and acid, the remaining three pounds were then distilled with water and the decoction employed for the closer examination of the more important constituents.

Ether took up tannin, which precipitated sesquichloride of iron with a brownish green color, resin, wax, fat and volatile oil. Alcohol now dissolved principally tannin, resin and an alkaloid. In the cold aqueous infusion, albumen was found, the decoction contained the above tannin and sugar, and the infusion with dilute hydrochloric acid showed the presence of oxalic acid. From the distillate with water, but a minute quantity of volatile oil could be separated, and traces of butyric acid were detected.

The residuary liquid in the still was filtered and precipitated by acetate of lead; this tannate of lead was subjected to elementary analysis, and yielded results corresponding very nearly with the formula  $2\text{PbO C}_{20} \text{H}_{14} \text{O}_4$ . The filtrate from this precipitate was treated with ammonia, the precipitate washed, dried, digested with alcohol, filtered, evaporated, treated with dilute hydrochloric acid, and again precipitated by ammonia. This alkaloid was added to a smaller quantity, obtained from the residuary bark by treating it with diluted sulphuric acid, and precipitating and purifying as before; the whole was then purified by dissolving it in bisulphide of carbon, and after removing the same, combining it with muriatic acid and precipitating by ammonia.

Thus prepared it is a white powder, with a greyish tinge, light, very electrical, inodorous and of a purely bitter taste; when triturated it adheres to the mortar like rosin. It remains unaltered in the shade, but assumes a yellowish color in the direct sunlight. Carefully heated in a test tube, it emits the odor of putrid meat, and afterwards gives off a faint odor of herrings. It fuses at  $128^\circ \text{C. (262}^\circ \text{F.)}$  is nearly insoluble in water, soluble in 1000 parts of ether spec. grav. .780 at  $16^\circ \text{C.}$  in 100 p. boiling ether, in 32 p. cold, and 2 p. boiling 98 per ct. alcohol; it likewise dissolves in chloroform, bisulphide of carbon, oil of turpentine and other volatile and fixed oils.

The alkaloid dissolves in and neutralizes dilute acids; concentrated nitric acid produces a brown yellow color, muriatic and sulphuric acid merely dissolve it; in the latter solution, chromate of potassa yields slowly a green color of chromic oxide. The yellowish solution in chlorine water is not affected by ammonia. From iodic acid, the alkaloid liberates iodine.

The neutral solution of the hydrochlorate shows the following behaviour to reagents: ammonia, potassa, limewater and alkaline carbonates a white precipitate insoluble in excess; nitropicric acid lemon yellow; tannin a yellowish white turbidity; iodide of potassium white, and in presence of free iodine brownish yellow; ferrocyanide of potassium white; ferridcyanide sulphur yellow; sulphocyanide white flocculent; phospho-molybdic acid, dirty yellow; terchloride of gold ochre yellow; bichloride of mercury white, soluble in water; bichloride of platinum pale greyish

yellow; nitrate of palladium yellow, with a tinge of orange red.

The author proposes for the new alkaloid the name *atherospermia*. Two elementary analysis gave somewhat different results, which seem to render the formula  $C_{30} H_{20} NO_5$  probable.

The resin was obtained of a brown red color, and a slight aromatic odor and taste; it fuses at  $114^{\circ} C.$ , and is readily soluble in alcohol, alkalies and their carbonates; ether and turpentine dissolve but traces. Its composition is  $C_{42} H_{32} O_{10}$ .

The air-dry bark yielded 3.64, after drying at  $100^{\circ} C.$  4.05 per ct. ashes, containing 30.005 carbonic acid, 45.445 lime and a small per centage of chloride of sodium, potassa, magnesia, alum, iron, manganese, sulphuric, phosphoric, and silicic acid.—(*Wittstein's V. Schr.* x. 504–519.)

J. M. M.

## ON THE PREPARATION OF CINNABAR.

By MAGNUS FIRMENICH, OF COLOGNE.

Cinnabar is most generally prepared in the dry way and on a large scale, by fusing one part of sulphur and seven parts mercury, and subjecting the fused mass to sublimation; or, as in Idria, by mixing the two elements in rotating barrels, and subliming afterwards from iron vessels. The process with sulphide of potassium is less known, but deserves the preference on account of the intensity of the color, and for the durability in fire of the product. A pure pentasulphide of potassium is necessary; those prepared by boiling an excess of sulphur in potassa, or by fusing potash with sulphur, are unfit for the purpose on account of the hyposulphite or the sulphate of potassa which is formed. Pure sulphide of potassium can only be obtained by reducing sulphate of potassa with charcoal; by saturating its solution afterwards with sulphur, the liquor is rendered fit for the process. Hessian crucibles are filled to three-fourths of their capacity, with an intimate mixture of 20 parts finely powdered sulphate of potassa, and 6 parts powdered charcoal, and heated, well covered in a furnace until effervescence ceases. This monosulphide is dissolved in  $3\frac{1}{2}$  parts of rain water, heated to boiling in an iron kettle, filtered and cooled to separate any undecomposed sulphate of potassa; the purified liquor is again boiled and saturated with

powdered sulphur of which four equivalents are required; it must be well protected from the atmosphere.

To prepare now the cinnabar, bottles are filled with 10 lbs. mercury, 2 lbs. sulphur, and  $4\frac{1}{2}$  lbs. of the above liquor; they are moderately heated, and placed in a swing in boxes, which are lined with straw, usually contain two such bottles, and are rocked against a straw cushion to increase the motion. The bottles commence to get warm after  $1\frac{1}{2}$  to 2 hours, and the mixture assumes a greenish brown color; the mercury combines with the sulphur of the dissolved sulphide, which is replenished by the sulphur of the mixture; to keep the latter in a loose condition, the bottles ought to be turned occasionally. The combination is completed in about  $3\frac{1}{2}$  hours, and the color of the mixture is now dark brown. After having been cooled slowly, the bottles are placed in a room, the temperature of which is between  $35$  and  $40^{\circ}$  R., ( $111$  and  $122^{\circ}$  F.) for two or three days, during which time the mixture is well agitated three or four times daily. The temperature has an important influence on the shade of the color, which is lighter the cooler the mixture has been on being put in the swing. Light carmine cinnabar, with a tinge of yellow, is obtained by exposing the bottles in winter to the cold atmosphere for one hour, or by setting them in summer in cold water for the same space of time.

The cinnabar is now to be freed from the excess of the sulphur; about half-a-quart of water is added to each bottle, and the contents thrown on a filter; the cinnabar is then treated in stone pots with caustic soda, and after the sulphur is dissolved, the liquor is decanted and the residue washed repeatedly with fresh water, which usually requires two or three days. The complete removal of the sulphur and of the alkaline liquor is most important, the durability in fire depending on the former, and the permanence of the color upon the latter. In order to dry the cinnabar, it is first transferred to the grate in a drying closet, where a very moderate heat is used for desiccation, until it breaks into pieces, and does not appear moist to the touch. Placed upon iron pans, it is introduced into a drying oven, where it is constantly turned, and gradually heated to  $50^{\circ}$  R. ( $144^{\circ}.5$  F.) This last manipulation is finished in about five hours. By the higher heat the cinnabar assumes, temporarily, a darker shade, and its durability in fire is much increased thereby.

This process I believe to be superior to all others ; for the qualities of the product are equal to or surpass those of cinnabar made in other ways, and at the same time the cost is much lower. (*Polytechn. Centralbl.*, 1861, 1025.)

J. M. M.

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ON MEDICINAL EXTRACTS, TAKING BELLADONNA AS  
AN EXAMPLE.

By PETER SQUIRE, F. L. S.,

President of the Pharmaceutical Society of Great Britain.

In many officinal preparations we find that there is considerable discrepancy between the processes directed to be used by the Pharmacopœia and those actually employed by manufacturers on a large scale. The dispensing Pharmaceutist may be very conscientious about his Pharmacopœia, but if his extracts are supplied to him with a label P. L., that is all he actually knows about them.

The manufacturer does not strictly follow the directions of the Pharmacopœia ; he employs the process which gives the best result, in the most direct manner. Now, up to the present time, I believe, that in some cases at any rate, the manufacturer who has desired to produce a good article has employed a better process than that given in the Pharmacopœia, probably, because he has had more practical experience than the framers of the Pharmacopœial formulæ.

Of all the officinal preparations, perhaps the extracts from the fresh herbs furnish the most striking example of this difference between precept and practice, and as the subject of the preparation of extracts has lately again occupied my attention, I have ascertained how far the practice of the manufacturer has differed from the directions of the Pharmacopœia, and to what extent he has succeeded in the quality of his product.

I may observe that the Pharmacopœia of 1851 profited by the experience of the manufacturer, for previous to that date the plants were ordered to be sprinkled with water ; the manufacturer had already dispensed with the water, and the Pharmacopœia followed the example.

The question which I wish to discuss this evening, is, whether medicinal extracts from green herbs are best prepared from leaves

only, or from all the soft parts of the plant taken together? The Pharmacopœia has for many years ordered leaves only; the manufacturers, as I shall presently show you, have employed the whole of the soft parts of the plant.

At present, I have only been able to test one plant. This opportunity was afforded me a short time since, by finding a quantity of belladonna which, on account of the severity of the winter, had only arrived at perfection at the end of September. I found it in full leaf and vigorous, partly in flower and partly in fruit. The plant was cut and conveyed to the laboratory without delay. It was trimmed—that is, the large and woody stalks were cut off and rejected. The leaves from 100 lbs. of this trimmed plant weighed  $64\frac{1}{2}$  lbs., and when bruised and pressed, yielded 34 lbs. of juice. The chlorophyll was separated; the juice was then coagulated, and the weight of the albumen thus precipitated weighed in its moist state  $5\frac{1}{2}$  ozs. The remaining juice, mixed with the chlorophyll, was then evaporated, and yielded 5 lbs. 3 ozs. of extract. The weight of the remaining soft parts, including flowers and fruit, was  $35\frac{1}{2}$  lbs., producing 18 lbs. of juice, 1 oz. of albumen, and 1 lb. 11 ozs. of extract.

The first of these extracts became mouldy in ten days; the second still remains perfectly good. An extract made of the whole plant, trimmed, also keeps well.

Before proceeding further I will give you the information that other manufacturers have kindly, and without reserve, afforded me. (Mr. Squire then read letters from Messrs. Allen, Herring, Holland, and Ransom, all large growers of medicinal herbs, or makers of extracts on an extensive scale.) These letters uniformly stated that the extracts made with the leaves *only* grew mouldy in a few weeks, whereas when made with the soft parts of the whole plant they would keep perfectly well, and remain of a good consistence, from one season to another.

It appears, from the experience of all manufacturers, that the juice of the stalk, &c., on account of the gum it contains, is indispensable to the preservation of the extract. The consistence is also greatly improved by it, and in the case of belladonna a plastic tenacious extract is what we require, and not one that either shrinks and becomes hard and unmanageable, or else

moulds and spoils ; for it should be remembered that we have to make a plaster as well as an ointment with it.

But then comes the question, Is the extract made from these other soft parts equal to that of the leaves in power? To ascertain this, I made solutions of the same strength, of the extract of the leaves, and of that prepared from the other parts. The solution from the stalks, &c., was marked *A*, that from the leaves *B*. These solutions were put into the hands of several gentlemen for experiment upon the pupil of the eye ; and by noting the time each required to dilate the pupil, and the degree of dilatation, they were able to ascertain which of them acted most powerfully. I may mention, that I have received reports from Dr. Garrod, who says that in twenty cases the results indicated that solution *A* possessed a decidedly greater power of dilating the pupil of the eye than solution *B*. Mr. Dixon, of Portman Square, says that he has only been able, from the short notice that I gave him, to try it in a few cases, but he would say that the solution marked *A* was more efficacious than that marked *B*. Mr. White Cooper had not tried the solutions sufficiently to satisfy himself in giving an opinion, and wanted more time. Mr. Streatfield gave a decided opinion in favor of *A*. Mr. Robert Taylor, of the Central London Ophthalmic Hospital, says the solution *A* acts much more rapidly and energetically upon the pupil of the eye than that marked *B*. Mr. Wordsworth decides in favor of *A*. All, therefore agree, that solution *A*—viz., that made from the stalks—is the more active.

We cannot, therefore, I think, resist the conclusion, that the extract from the young stalks, flowers, and fruit, taken together, is really the better extract of the two ; and although we may condemn the practice of disobeying the Pharmacopœia, we cannot but regret that directions should have been given, which entail upon the manufacturer the loss of at least one-third of his produce, yield a less efficient preparation, and one that is of a bad consistence, and that will not keep longer than a few weeks.

In looking back into former Pharmacopœias, we find no mention of preparations corresponding to extracts from the green plants until 1746, when the leaves of rue and those of savine were ordered to be employed for the purpose, and were directed to be *boiled, strained, and evaporated*. In 1788 an extract of

hemlock was first ordered, but here the whole plant was directed to be taken, then bruised, and the juice expressed and evaporated with care; then, in 1809, these preparations, which had previously been styled inspissated juices, were installed as extracts, and the hemlock (together with aconite, belladonna, and hyoscyamus, now for the first time introduced,) were all ordered to be sprinkled with water before pressing out the juice. But for reasons with which we are not acquainted, the *leaves only* were ordered to be employed. However, Dr. Powell, the authorized translator of that edition, is by no means explicit about the matter, for in his remarks on these extracts, he says: "The texture of the *plant* is first destroyed by bruising, and its juice expressed is then evaporated." The College also directed that a small quantity of rectified spirit should be sprinkled on all the soft extracts. The Pharmacopœias of 1824 and 1836 followed exactly the steps of their predecessors, and, in the latter edition, the translator adds to the remarks of Dr. Powell just quoted, the words, "to prevent its becoming mouldy."—*Lond. Pharm. Jour.*, Dec. 1861.

[On the reading of this paper an interesting discussion ensued, which is too long for insertion entire. The following outline of what was said is abridged from the published account.—*Ed. Am. Jour. Pharm.*]

Mr. Deane had some experience in making extracts of juices, and found them to keep well if evaporated without coagulating the albumen; but if evaporated below boiling, if sufficient to coagulate the albumen, yet the presence of the latter in a coagulated state would cause mouldiness. This was not so if boiling was resorted to. He had found extracts prepared in vacuo to spoil from the same causes, viz:—the partially coagulated but *uncooked* albumen. A somewhat analogous result occurred, with some other extracts, as liquorice and poppies, when made at a low temperature, as on keeping they underwent a sort of fermentation and gave off gas, which caused the swelling of the mass. Much of the efficiency, elegance and permanence of green extracts depended on the proper condition of the plants when gathered, and at the time of operating; especially was it objectionable to have the herbs to heat by lying in masses after being gathered. Plants gathered too early were more albuminous and less active. The inflorescence should be one-third over when gathered. At this age plants yielded extracts of the best consistence. Mr. Deane concluded by some remarks to young men, urging on their attention the importance of botanic studies.

Mr. Cracknell had for some years paid much attention to the preparation



of this class of extracts, and could endorse the remarks of Mr. Squire relative to the advantage of using the soft stalks and flowers with the leaves, not only as aiding the extraction of the juice, but as causing them to keep better when finished.

Mr. Francis used the whole plant and evaporated the juice in an open steam pan, at the boiling temperature, as rapidly as possible, to the consistency of treacle, and then in shallow dishes exposed to the sun. He had found extracts made from the leaves only to mould and ferment.

Mr. Haselden had seen very good extracts prepared according to the directions of the London Pharmacopœia. The difficulty was in cooking them to the right consistence. He could not assert that such extract was stronger than that from both leaves and stalks, but for commercial purposes the latter was advantageous.

Mr. Brady also advocated the views of Mr. Squire.

Mr. Heathfield, in 1831, was engaged in a course of experiments in the laboratory of the late Mr. Battley, with a view of ascertaining the qualities of the juices of narcotic plants generally, and these had included the separate juices of the leaves, buds and soft stalks from the woody stalks; and lastly from the whole plant. Each juice was coagulated by heat, and the albumen and coloring matter removed and placed in dishes. The coagula fermented much sooner than the juices; the coagulum was greatest in the juice of leaves alone; and the juices of leaves fermented sooner than that of the stalks. Mr. Battley found from 200 to 250 grains of alkaline chlorides in six gallons of conium juice. The extracts of the pure juices kept better than when the green matter was retained, and those which tended most strongly to mould contained the most albumen.

Mr. Davenport and Mr. Bottle next spoke. The latter remarked, that as the albumen and green color of extracts tended to spoil, and that those made from partially fermented herbs were dark-colored, whether he was to infer that the latter were best. In hay-making a slight fermentation increases nutrient power; does the same course favor medicinal power in these herbs?

Mr. Holland urged, after large experience in making extracts, that it was very important to use the herbs before they had undergone any change, and that herbs that had heated by fermentation yielded a much deteriorated extract. It was his practice to use all but the large stalks, and as soon after coming from the field as possible, and that such extracts had a good consistence from one season to another, whilst extracts from leaves only speedily spoiled; and that no such extract would keep unless the young stalks were included with the leaves.

Mr. Bentley made some general remarks, when Mr. Hills arose to corroborate the statements of Mr. Squire, Mr. Deane, and Mr. Cracknell. He also stated that steam heat could not be used to evaporate juices, without partially coagulating their albumen. In answer to a question of the President, Mr. Hills said, that in his laboratory one hundred weight of the leaves and

softer parts of belladonna had yielded, in 1859, 1 lb. 9½ ozs. of extract; in 1860, 1 lb. 10½ ozs.; and in 1861, 2 lbs. 4 ozs., at a temperature below 100° F. Mr. Hills thought that the rejected coarse stems amounted to three-fourths of every hundred weight.

[The discussion was continued at an adjourned meeting, the notice of which was published in the *Pharm. Jour.* for January, from which we abridge the following.—Ed.]

Mr. Squire, in opening the subject, desired to say that nothing which had been brought forward at the last meeting should be understood as justifying a deviation from the Pharmacopœia, for the preparations it ordered; but, that while adherence to that authority was important, it was highly important, also, that its processes should be such as practical men could adopt, and which would realize the object of the framers. Since the last meeting he had had further testimony in regard to the extract marked A, from Mr. Cooper, whose results indicated that it was one-fourth stronger than the extract of the leaves alone. He then passed in review the processes of the foreign Pharmacopœias, as follows:—

The Prussian Pharm. orders 10 lbs. of the leaves and flowering branches, bruised with 1½ lbs. water, pressed; the marc treated with more water, and pressed again; the liquor strained, evaporated to 2 lbs., mixed with 2 lbs. of alcohol filtered and evaporated to an extract.

The Belgian Pharm. of 1854, orders the flowering herb to be bruised, with a small quantity of water, pressed, strained; the liquor evaporated to one-fourth or to a syrupy consistence, then spread on dishes and evaporated to dryness.

The Austrian Pharmacopœia of 1855 is like the Belgian process, except that the juice is evaporated at once to dryness.

The United States Pharmacopœia of 1850 directs the juice of the leaves to be evaporated *after* the separation and rejection of the chlorophyll and albumen.

The Norwegian Pharm. of 1854 employs the dried leaves, to be treated, first with water and then with spirit, and the liquors evaporated and mixed.

Dr. Redwood regretted his absence at the previous meeting, and felt dissatisfied with the result of the discussion, in three points of view; first, he feared that an implied justification of deviation from the Pharmacopœia by manufacturers was apparent, which should be avoided in any paper emanating from the Society. He also believed that a false impression was gained from the paper of Mr. Squire, in regard to the relative value of the extracts from the leaves and stalks of belladonna; that the so-called extracts of the stalks of Mr. S., was from the small stalks, flowers and fruit; and no evidence was produced that the stalks in the abstract yielded an efficacious extract; that such an opinion gaining credence would cause manufacturers to use only the other parts of the plant, and keep the leaves for selling as such in a dried state, or in powder; and that such a result

should be guarded against. He stated that the juice of the leaves was, by those qualified to judge, considered to be more highly elaborated than is that of the stalks, and hence the direction of the Pharmacopœia; yet he saw no objection to "the leaves and flowering tops," as suggested by Mr. Squire, provided it was not construed to mean the whole plant.

The last point which Dr. Redwood noticed, was the fact that the extract of leaves of Mr. Squire should mould *after* the albumen was removed, thus shaking confidence in this process, heretofore strongly advocated by Mr. Squire. He was convinced that in these cases the removal of the albumen had only been partial. He (Dr. R.) had never been fully convinced of the efficacy of this process, and was now inclined to favor the process that most European and American Pharmacopœias had adopted, in which both the chlorophyll and albumen were removed from the extract, and when so prepared they did not mould.

The President, (Mr. Squire,) after some further explanatory remarks, was followed by Mr. Samuel Gale, who had, in reading Mr. Squire's paper, understood extract A to be of the stalks only. He stated that at the laboratory of Bell & Co., these extracts were made by evaporating the juices at 120° F. by a water bath heat and that such extracts even when from the leaves only, keep without moulding.

Mr. Daniel Hanbury gathered from what had been said that the extract of the juice of the small stems, flowers and fruit, was better than that made from the leaves, and that the leaves might be applied for other purposes.

After a few remarks by Mr. Mee, Prof. Bentley, and Mr. Cutting, the meeting adjourned.

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## ON EXTRACT OF GENTIAN.

By LEIBUNDGUT.

The author dissolved 4 oz. of extract in 12 oz. of boiling 85 per cent. alcohol; after cooling, a blackish brown residue was separated by filtration, which reduced Trommer's test; 6 oz. of water were added to the filtrate and the mixture distilled; the distillate was colorless, and possessed a neutral reaction and aromatic odor and taste. The aqueous residue was, after filtration, digested with animal charcoal, and the latter, after having been washed with water, was exhausted with boiling alcohol, which on evaporation left a dark-yellow sticky residue of slight acid reaction and peculiar aromatic odor, and reducing the oxide of copper from Trommer's test. The solution in cold water was clear, and became slightly turbid by subacetate of lead. The

filtrate was freed from lead by sulphuretted hydrogen, and when evaporated left a very bitter extract. It was dissolved in alcohol and the solution agitated with ether; the alcoholic ether had retained nothing of importance in solution, while the separated syrup contained all the bitterness.

The aqueous liquid filtered from the charcoal was of a nice brown-yellow color, showed a strong iridescence in green, had a sweetish taste, and readily reduced the oxide of copper from Trommer's solution. Subacetate of lead precipitated some acids, which were scarcely acted on by sesquichloride of iron. The syrup obtained by evaporation, was dissolved in alcohol when the iridescence reappeared, and then mixed with ether, when a syrup separated which could not be crystallized; dried in the waterbath, it weighed  $1\frac{1}{2}$  oz. The alcoholic ether had taken up from the syrup a little of a brown bitter substance.

The author obtained the bitter principle, like Dulk, in the form of a brownish yellow extract, he intends to experiment with the fresh root of *Gentiana lutea*, hoping therefrom to gain the gentianine in a state unobjectionable to chemists. The above extract was prepared by the process of the Prussian Pharmacopœia.—*Achiv d. Pharm.*, cvii. 132-135. J. M. M.

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#### SULPHUR IN CALIFORNIA.

The refining of sulphur has been commenced as a business in Santa Barbara county, Cal. Twenty miles south-eastward of the town of Santa Barbara, and seven miles back from the Mission of San Buenaventura, which is upon the sea shore, is a great bed of native sulphur, deposited in remote ages by the vapors and waters of sulphur springs. The country in the vicinity bears strong marks of volcanic action. The sulphur deposits back of San Buenaventura have long been known, but only lately has it been rendered valuable. Messrs. Davidson, Spence & Co. commenced about the first of this year to open the mine. The *Daily Alta* says, that there were then some half a dozen men at work in the mine, and this sulphur is so abundant and accessible, that the time is perhaps not far distant when it will be shipped to Europe. The crude deposit is stated to comprise 8° per cent. of sulphur.—*Scientific American*.

(Continued from page 88.)

late is so fractioned by *partial combination with a base*, and distillation as described in the examination of the watery distillate (page 280, vol. ix.) which is obtained by the decoction of the material under examination with water. The non-volatile fatty acids, partly solid and partly fluid, are treated precisely as though they had been obtained by saponification from the fatty mixture alone, which was above spoken of.

The *liquid fatty acids*, which are obtained as ethereal solutions of their lead salts, by the treatment as above given of the salts of the fatty acids with ether, may be likewise mixtures of several liquid fatty acids. After the expulsion of the ether they must be separated from the lead and thrown down by *fractional precipitation* from one another, precisely as stated for the solid fatty acids.

Since it has been discovered that not only fatty acids, but also benzoic acid, may be contained in fatty mixtures as a glyceryle compound, it is no longer improbable that the glyceryle compounds of other acids besides those of the proper fatty acids, may be found in many fats when attention is directed thereto.

To ascertain *whether other acids besides the fatty are contained or not as glyceryle compounds* in the mixture of fats, the fluid which is obtained when the fat is saponified, and the soap separated by common salt, is filtered and evaporated in a water bath until it is reduced to a very small volume. Glycerine and common salt are always found in this residue, besides free potash, carbonate of potash, and small quantities of dissolved soap. If glyceryle compounds of benzoic acid or of other acids were contained besides in the fat, the potash salts of the acids are dissolved likewise in this fluid. The residue, which is obtained by evaporation, is divided into two parts. The *first part* is mixed with a solution of chloride of calcium, which precipitates a little carbonate of lime as well as the compounds of smaller quantities of fatty acids with lime, which are insoluble in water. The lime salt of the acid, which is present in addition to the fatty acid, either precipitates or remains dissolved. If it remains dissolved, a solution of the salt of the acid sought for is obtained by filtering the fluid from the carbonate of lime, as well as from the lime salts of the fatty acids; but the solution is contaminated with glycerine and common salt. This fluid is evaporated to concentrate it. The residue is mixed with *hydrochloric acid*. If benzoic acid, or any acid difficultly soluble in cold water, is present, it is precipitated by the addition of hydrochloric acid. When nothing is thrown down, either no acid or one very soluble in water was present. To arrive at certainty on this point, a *second portion* of the residue of evaporation above mentioned is precipitated with chloride of calcium, the resulting precipitate collected and washed with water, diffused in a little water and mixed with *dilute sulphuric acid*. The decomposition is promoted by heat until it is completed. The fluid, still hot, is then filtered through a moist filter. If with the fatty acids, another acid is precipitated by chloride of calcium, as a

lime salt insoluble in water, it must be contained in this filtrate with a little free sulphuric acid. To discover the presence of an acid, which is neither difficultly soluble in water, nor gives with lime an insoluble salt, we proceed in the following way:—

*A portion of the fat under examination is saponified by boiling with thin milk of lime, and the hot fluid containing glycerine is filtered from the lime soap. Carbonic acid is conducted into the filtrate, heated for the decomposition of the bicarbonate of lime, and filtered. The filtrate contains the lime salt of the acid sought for and glycerine. The fluid is mixed with basic acetate of lead, and the precipitate perchance resulting is separated by filtration from the fluid. The lead salt is washed with water, diffused in water, and decomposed by sulphuretted hydrogen. In the fluid filtered from the sulphuret of lead, the acid sought for is contained. There are only a few acids which produce no precipitate with basic acetate of lead. Should such an acid be present instead of basic acetate of lead, a solution of nitrate of silver mixed with a little ammonia is added, which precipitates a silver salt of the acid. If in this way no precipitation results, the concentrated fluid, wherein the acid and glycerine exist in solution, is digested with freshly precipitated carbonate of zinc or copper, and absolute alcohol is added to the filtered fluid, by which a zinc or copper salt of the acid is thrown down, but not the glycerine. When an acid which is volatile is mixed with the glycercyle compound in the fat, it will have been already found in the examination of the volatile fatty acids.*

*When fats and resins are mixed with one another, the mixture is treated with a solution of caustic potash to effect the saponification of the fats. The electro-negative resins dissolve likewise as potash compounds therein, while the indifferent resins remain undissolved. After the insoluble part of the resin has been separated, the solution of soap and resin soap is treated with common salt, and the soap of the fatty acids is separated, but not the resin soap. The soap which has separated is treated as previously described (page 87). The solution of resin soap, which at the same time contains the glycerine of the fat, is mixed with dilute hydrochloric or sulphuric acids, whereby the resinous acids are separated. They often agglomerate, particularly when heated, and may be easily taken from the fluid and further purified. Sometimes it is necessary to evaporate the liquid, because a milky fluid results with acids which will not filter clear. The resinous acids separated are again dissolved in a solution of potash, and mixed with an excess of a strong solution of potash. By these means frequently a separation of several resinous acids is effected. Many potash salts of the resins are soluble, while others are insoluble in a concentrated solution of potash.*

Before I conclude, the consideration of the mixtures of resins and fats separated from the spirituous extract, by cooling or distilling off the alcohol, I must direct attention to a point in the treatment of resins. *Some resins are copulated compounds. Two resins are already known which break*

up into two products one of which is grape sugar. It is therefore probable that not only are other resins such copulated carbo-hydrates, but that some resins are compounds, which, by the action of an acid or an alkali, may be split up into two products, one of which is not grape sugar. The resins must in this respect be more minutely examined.

This examination is conducted in the manner described (pages 472, vol. ix., and 87, vol. x.) for the investigation of copulated compounds with acids and alkalies.

It is self-evident that in the presence of *several resinous acids*, their separation can be accomplished in the same manner as this is effected with non-resinous acids, namely, by *fractional precipitation*.

When the spirit is distilled off from the alcohol extract, and the separated resins, fats, and wax-like bodies are separated from the watery residue, and the watery fluid is freed from every trace of suspended substances by a moist filter, this *watery solution* is now a subject for examination.

*b.—Watery residue after the removal of the alcohol from the spirituous extract or decoction.*

This fluid is diluted with a little water, and precipitated with a *solution of sugar of lead*, the precipitate collected on a filter, the filtered liquid mixed with *basic acetate of lead* as long as a precipitate results; and this second precipitate is also separated from the fluid by a filter. The filtered liquid is freed from lead by sulphuretted hydrogen, from sulphuret of lead, by filtration, and from sulphuretted hydrogen by heating it. This fluid, as well as both the precipitates obtained by sugar of lead and subacetate of lead, are treated precisely as the precipitates and fluid were treated which were obtained by the corresponding treatment of the watery decoction of the material to be examined.

It is here to be remarked, that by the examination of this precipitate, as well as those obtained by sugar of lead and subacetate of lead, substances will be found which have been also found by the examination of the precipitates obtained from the watery decoction. Thus far, this examination is a control of the previous one. However, these precipitates generally exhibit a less complicated composition than those obtained from the watery decoction. The spirit does not dissolve many salts—particularly of the inorganic acids, sulphuric acid, phosphoric acid, &c. The pectine bodies are quite as little dissolved by spirit. In the precipitate obtained by sugar of lead, certain bodies are therefore absent which are precipitated by sugar of lead from the watery decoction. On the other hand, no gum is dissolved by spirit, as well as some allied substances, which would be contained in the watery decoction, and then would pass over into the precipitate which subacetate of lead produces in the watery decoction. For the preparation of many bodies it is, therefore, much better to use the precipitates which are precipitated from the watery residue of the spirituous extract than the corresponding precipitates from the watery decoction.

Although we often obtain useful results by following the prescribed

method of examination, on the contrary it will happen in many cases that this prescribed method is not the best, and must be replaced by another which renders possible the separation of bodies, which cannot be accomplished with the same precision in the method given. Particularly when coloring matters are contained in the spirituous extract, their isolation by the methods already prescribed cannot be performed quickly or perfectly.

In such cases, *the hydrate of alumina* is often employed with remarkable results for a preliminary separation of the constituents. This is prepared by precipitating a solution of alum with sulphide of ammonium, the precipitate is washed at the commencement by decantation, and then washed on a filter with water, and removed from the filter in a moist, gelatinous condition. It can be preserved in closed vessels for use in a *moist condition*, or at once employed; the gelatinous hydrate is rubbed with water, which is added by degrees in small quantities, to a smooth thin paste. This is added to the watery fluid which has been obtained after the distillation of the spirit from spirituous extract of the material under examination, and after the removal of the fatty and resinous deposits by filtration, the hydrate of alumina is diffused equally through the fluid by stirring, and allowed to remain in contact twenty-four hours, with frequent stirring. At the expiration of this time the fluid is filtered from the alumina, which is washed on a filter with water; the filtered liquid, as well as the alumina on the filter are subjected to further examination. There are bodies which combine with alumina, and others which form no combination with it. The bodies which can combine with alumina are on the filter with the alumina, which has been added in excess, in the form of salts of alumina, or are retained by the alumina in the same way that many bodies are fixed by charcoal or sulphide of lead. *The mixture of alumina and alumina compounds* is treated precisely as the alumina precipitate which has been obtained by the alum and ammonia from the watery decoction. *The liquid which is filtered from the alumina and its compounds* is precipitated with *subacetate of lead*; this precipitate is separated from the fluid by filtration, the fluid from the lead by *sulphuretted hydrogen*, and freed from the sulphuretted hydrogen by heat after the sulphuret of lead has been filtered off. This lead precipitate, and the fluid filtered therefrom, are treated like the corresponding fluid and precipitate were treated when no alumina had been previously added to the aqueous residue of the spirituous extract. Frequently, in the spirituous extract there are two coloring matters present, one of which has the nature of a resin. Such coloring matters separate contemporaneously with the fats and resins, when the spirit is distilled from the extract, and they are isolated in the examination of the resins. Many coloring matters remain dissolved in the water after the spirit is distilled off. This case often occurs that one of the coloring matters is completely combined and retained by the freshly-precipitated alumina, with other bodies, when a sufficient quantity of alumina has been added to the fluid, while the other coloring matter remains behind in the fluid. The latter is



then precipitated with other bodies by the addition of subacetate of lead. In the majority of cases, *the coloring matter* is retained by the sulphuret of lead after the decomposition of the precipitate by sulphuretted hydrogen, so that it can be *extracted by hot alcohol from the sulphuret of lead*, after the removal of the other constituents by water.

Before concluding this chapter, I have to return to the deposits from the alcoholic tincture, which in many instances occur after the cooling, or after the distillation of the alcohol. Occasionally, a body or a mixture of bodies, is separated in the form of powders, which may be readily collected upon a filter for further examination. Sometimes, however, no deposit takes place after cooling, and after most or all of the alcohol has been distilled off, a gelatinous mass or a jelly is obtained after cooling, which, after having been mixed with water, cannot be filtered, or at least clogs the pores of the filter in a short time, thus stopping filtration completely. There remains no alternative in such cases, but to add again the distilled spirit to the residuary liquid, and to warm the whole, in order to effect a solution; this solution is then precipitated by a solution of acetate of lead in hydrated alcohol, the filtrate precipitated by subacetate of lead, and the liquid filtering from this precipitate, freed from lead by sulphuretted hydrogen. Both precipitates are treated in precisely the same manner as the precipitates obtained by acetate and subacetate of lead, from the aqueous decoction of the material under examination. The liquid which has been freed from lead by sulphuretted hydrogen, may contain substances which yield with lead compounds soluble in alcohol. The alcohol is therefore distilled off, and the aqueous residue is treated with basic acetate of lead, which will produce a precipitate, if the alcoholic solution had contained lead compounds which are insoluble in water. The liquid filtered from this precipitate is freed from lead by sulphuretted hydrogen, and can now be regarded as completely liberated from substances which are precipitated by lead; it is then further examined.

#### VI.—*Examination of the ethereal extract.*

The extract of the material under examination, after the ether has been separated by distillation in a water bath, will leave mostly fats or resins, or a mixture of both. It frequently contains small, seldom large quantities of other bodies, which are dissolved equally by water or spirit, and are found in the watery decoction or spirituous extract. Free acids, organic bases, and various indifferent bodies may be taken up by the ether. *The residue which remains after distilling off the ether* is consequently first *boiled with water*. Tannin and analogous bodies, some vegetable bases and other substances, are taken up by the water, while the fats and resins remain undissolved. The watery solution of the ethereal extract is treated precisely as the watery decoction of the material under examination. *The residue insoluble in water*, after the separation of all the water, is submitted to a further examination. A *portion* thereof is treated with sulphuret of

carbon, to ascertain whether a separation can be thereby effected into two parts. If no separation is possible, *the whole residue left, after treating the remaining portion of the ethereal extract with water*, is treated; or when a separation has been accomplished, by sulphuret of carbon: then the portion insoluble in sulphuret of carbon by itself, and the portion which remains after distilling off the sulphuret of carbon by itself, are treated as described for the mixture of fats and resins, which is obtained from the material under examination by extraction with spirit, and cooling the tincture, or by distilling off the alcohol. (See pages 84 to 179.)

VII.—*Examination of the matter extracted by spirit containing potash or ammonia.*

The solution which is obtained by spirit containing potassa or ammonia is sometimes very suitable for the isolation of substances which could only be procured with difficulty in a pure condition from the material under examination in another way. The substances whose isolation may be attempted from this solution are those which are sparingly soluble in very diluted alcohol, but are dissolved in considerable quantity by potassa or ammonia, so that the greatest portion of them is separated by an acid, while others extracted at the same time are not precipitated after the addition of an acid, because they are soluble likewise in their free state, in very dilute alcohol. Frequently, carbonic acid suffices to decompose the compounds of these substances with potash or ammonia, so that carbonate of potash and the substance which was combined with the alkali are together separated. Sometimes stronger acids, as acetic, sulphuric, or hydrochloric acid, are necessary for the decomposition. At first, therefore, *carbonic acid* is always conducted into the alkaline spirituous extract, to see whether a precipitation of organic substance takes place. When this is the case, the precipitate is filtered from the fluid and examined more closely. The filtered fluid is mixed then with hydrochloric acid, to ascertain whether a precipitate is thereby produced. In this way it is possible to separate one or more weaker acids from stronger ones. The precipitates produced by hydrochloric acid must be separated by filtration from the fluid, which is not further examined. Various peculiar bodies are readily obtained in this way pure; for example, chrysophanic acid from rhubarb and *parmelia parietina*, also usnic acid and analogous bodies from many lichens. The preparation of these bodies is in no other way so easily and rapidly performed as in this manner. Naturally the precipitates produced by hydrochloric acid, as well as by carbonic acid, may be not only one substance, but a mixture of several bodies, and it is therefore necessary to learn whether by treatment with *alcohol, ether and water*, a separation is possible or not into several constituents. When it is not possible to effect a separation of the mixed bodies, by their unequal solubility in these solvents, then a solution of the mixture is made in that menstruum which most readily effects its solution, such as ammoniacal water or ammoniacal spirit, and

the separation is accomplished by fractional precipitation with a suitable metallic salt. In this case it is necessary to take care that no excess of ammonia is present. *Solutions of acetate of copper, acetate of lead, or chloride of calcium* are generally the most suitable salts for fractional precipitation. By a preliminary experiment it may be learnt which is the best to employ.

By the prescribed treatment of the extract whose preparation was explained in page 13, a number of substances have been prepared, not all of which can be regarded as isolated constituents, although such may be the case with many of them. Substances which have been separated from others, by the methods described in the 2nd section, will frequently be obtained in a state of contamination with small quantities of other constituents. But as we have prepared these bodies from different extracts of the same material, according to different methods, generally twice or oftener, their peculiarities may still be recognized, even when the substance has in no case been obtained quite pure, because the impurities from the different methods of preparation must be alike. After following the directions given, and from the evidence thus obtained, it is often impossible to know whether we had to do with one individual body or several bodies. Thus, by the fractional precipitation or solution of precipitates, it must often be felt undecided whether the individual solutions or precipitations contain the same or different bodies; and when the presence of several bodies has been detected in the different solutions or precipitates, whether these individual portions are to be fractionized still further or not by a repetition of this kind of treatment, in accordance with our failure or success in isolating a body from one of these portions. The following section will treat of the manner in which we can obtain information on these points, by the aid of reagents, and of the kind of reagents which in the majority of cases will answer this purpose.

### SECTION III.

#### *Reagents and their application.*

It has often been stated in the second section, that the further examination of a body, by the observation of its behaviour to reagents, is required, not merely to decide by its reactions the identity of a body with one already known, but chiefly to prevent constituents being overlooked by the aid of their reactions.

If we have obtained a substance by fractional solution of a precipitate, or by fractional precipitation, of which we could not previously know whether it is only one body or a mixture of two, three, or several bodies, and have divided it into several portions, and allowed a number of reagents to act on each portion, we shall be able to ascertain whether we have to do with one or several bodies differing from one another.

I am certainly far from believing that only the reagents described in the following pages are useful means for the attainment of this object, but I

have there described a number of reagents which are serviceable in the majority of cases, whose behaviour is known to organic bodies, and which every body is in a position to prepare or to procure more readily than others. I have only appended those remarks to each test which did not appear superfluous in reference to the objects of the present instructions for the analysis of vegetable substances.

1. *Perchloride of iron*, prepared by dissolving dry crystallized perchloride of iron in water. A great number of organic bodies afford with a solution of perchloride of iron, when it is added to their aqueous solutions, neither a precipitate nor a coloration. Many of the most widely-spread constituents of plants behave in their aqueous solution exactly as though this reagent was added to pure water. On the contrary, not a few compounds exist which give this reagent a remarkable coloration, or are entirely precipitated, whereby the color of the precipitate is generally a conspicuous one. There cannot be any conclusion drawn on the nature of a body which is contained in this solution, from the coloration which a solution of perchloride of iron assumes, or from the color of the precipitate produced by this reagent. Morphine, gallic acid, and the aldehyde of salicylic acid, bodies which belong to three different classes, behave very analogous to a solution of perchloride of iron. Nevertheless, this reagent is very serviceable, inasmuch as bodies which produce with other reagents very few characteristic reactions, show by this reagent when they are mixed in very small quantities with other bodies. A great number of vegetable substances afford, when their aqueous solutions are mixed with a solution of perchloride of iron, a dark green or blue coloration, as is well known. Tannin, gallic acid, and many other similar bodies, exhibit this behaviour. Other substances acquire an intense red color when their solutions are mixed with perchloride of iron. It is always advisable to add the perchloride of iron in very small quantities to the fluid under examination, as frequently the color which makes its appearance by a smaller quantity of this salt is destroyed by a larger quantity. There are substances which, by the addition of this reagent, acquire an intense color, but the color soon disappears again, and cannot be reproduced, while with other bodies a coloration results which long remains unchanged. The coloration effected by perchloride of iron is often made to disappear more quickly by the application of heat. The coloration which is developed by perchloride of iron in the solution of a substance is often quite different, according as the substance is present in a free condition, or combined to an acid, or to a base. Frequently it depends on the nature of this acid or base whether a coloration is developed or not. It is a known fact, that not all morphine salts exhibit an equally intense blue coloration when mixed with perchloride of iron, which is shown with some morphia salts every time this reagent is added. Kinic acid in a free state, in an aqueous solution, is colored intensely green by perchloride of iron, while after its neutralization with ammonia it as-

(To be continued.)

## Varieties.

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*Dangerous character of Benzine.*—A recent review of fires in this city since the 24th of October, by the fire marshal, Mr. A. W. Blackburn, refers to benzine in connection with two or three disastrous fires originating through its use. The fire marshal has been convinced that haversacks and knapsacks, made of duck or muslin, or any kind of linen or cotton fabric, when coated with paint, composed of lampblack and linseed oil, hastily and carelessly mixed, and then glazed with varnish, in which benzine is an ingredient, when packed tightly in boxes for transportation, or closely piled in heaps in manufactories, are constantly liable to take fire from spontaneous combustion. Benzine is a component part of petroleum or coal-oil in its crude state, as it comes from the earth. In refining coal-oil for burning or lighting purposes, the benzine, which is highly explosive, is got rid of by the process of distillation. From being, as it was first considered, a refuse substance, it is now fast becoming an important article of trade. In various manufacturing and mechanical arts, it has been found an admirable substitute for turpentine, and owing to the scarcity and high price of the latter article, since the blockade of the North Carolina ports, benzine, from its comparative cheapness—and, indeed, from the almost absolute necessity of the case—is fast taking its place. It makes a handsome and durable paint, and on wood and other solid surfaces, is harmless; but as an ingredient in the coating on vegetable textile material, it is, at all times, more or less dangerous. It is very volatile, and at a certain temperature rapidly assumes a gaseous form. Where articles, such as knapsacks, haversacks, etc., freshly glazed with varnish made with it, are undergoing the process of drying, especially by the heat of boilers or steam-pipes, the whole surrounding atmosphere becomes filled with benzine gas, and let combustion ensue from any cause whatever, at such a time, the apartment will be enveloped in flames with the rapidity of lightning. These facts are well worth the attentive consideration of underwriters.—*Druggists' Circular, from Tuckett's Phila. Ins. Journal.*

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*Test for the Purity of Acetic Acid.* By JOHN LIGHTFOOT.—Whilst making experiments on pyroligneous acid with a view to make pure acetic acid, I have been at a loss for a delicate test to ascertain when the acetic acid is entirely free from "emphyreuma," which, hitherto, I have found very difficult (when so dilute as not to be tasted or smelt), and I am not aware of a good test for that purpose; but I have found, by neutralizing the acetic acid suspected to contain "emphyreuma," or "emphyreumatic oil," by carbonate of soda or potash and adding a solution of permanganate

of potash (Condy's fluid), that, if pure, it remains pinky and unaltered; but if it contains the slightest trace of empyreuma, the permanganate of potash is immediately decolorized, and after standing a short time, a brown precipitate is produced, but this is not the case when the acetic acid is absolutely pure.—*Chemical News, London, Nov. 30, 1861.*

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*Cinnamates and Nitro-cinnamates.*—M. E. Kopp has prepared and described many of these (*Comptes Rendus*, t. liii. p. 634). The general properties of the cinnamates he describes as follows:—Those with an alkaline base are soluble in water. The alkaline-earthly salts are but slightly soluble in the cold, but more so when heated. The earthy salts are insoluble, and are partially decomposed by boiling water. The metallic salts are almost insoluble even in boiling water, but are in general dissolved on the addition of a little acetic acid.

*Nitro-cinnamic*, though a weak acid, forms neutral salts, and decomposes alkaline carbonates. The alkaline salts are very soluble, the others are but slightly so, or are altogether insoluble. They all deflagrate when quickly heated.

*Cinnamene*,  $C_{10}H_8$ , is not only isomeric but completely identical with styrol. When pure it will change spontaneously into metacinnamene perfectly solid, transparent, and having all the properties, chemical and optical, of metastyrol.—*Chem. News, London, Dec. 21, 1861.*

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*Preservation of Proto-Iodide of Iron*, by M. Vezu.—Since M. Blancard made the use of pills of iodide of iron general, by indicating a sure means of preserving them, many persons, in whose hands his formula did not succeed, have proposed other methods, now forgotten. M. Vezu proposes to shield the iodide from contact with air, by dissolving it in a fatty body—cacao-nut butter. To four parts of iodine, dissolved in the melted butter of cacao-nut, he adds six parts of reduced iron, and keeps the mixture in a semi-liquid state for three or four hours, until it takes a bottle green hue, and does not color moistened starch paper, when a thin layer is spread over it. According to M. Vezu, the iodide dissolves in butter of cacao-nut without sensibly attacking it.—*Chem. News, London, Jan. 4, 1862, from Repertoire de Pharmacie.*

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*Coal in California.*—We learn from the *California Mining and Scientific Press* that a meeting of the members of the California Academy of Science, was held in San Francisco on May 15, at which Professor Blake gave an interesting description of the coal regions of Monte Diablo, accompanied with specimens of the coal. The veins are rather thin, but the coal is good bituminous. The fossils of the region belong to the tertiary formation. Professor Whitney is of opinion that the coal was formed from accumulations carried by eddies, and deposited in still water. A

considerable quantity of this coal has been taken to San Francisco, and it has tended to reduce the price of wood and the foreign coal. A plentiful supply of coal in California would tend greatly to facilitate quartz-mining, by enabling the machinery to be operated by cheap steam power. Coal will also make California a great manufacturing State.—*Chem. News, London, Aug. 10, 1861.*

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*Explosion in making Phosphoric Acid.*—Elsner relates (*Chem. tech. Mittheilungen*, 1859–60, s. 121) that some time since as a chemist was making phosphoric acid, by acting on phosphorus with nitric acid in a retort, a tremendous explosion took place when the mixture was heated, which not only shattered the retort, but blew out all the windows, and even shook the walls of the laboratory. The cause of the explosion he supposes to be the formation of phosphuretted hydrogen from the sudden decomposition of vapor of phosphorous acid into that gas and phosphoric acid. Elsner recommends that the phosphorus should be treated with nitric acid in a large dish, so that the vapor of phosphorous acid may have free escape.—*Chem. News, London, Aug. 10, 1861.*

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*Emery.*—The trade in emery is not, as formerly, monopolised by the Greek Government, which now levies a tax of 5 drachms per hundred weight when exported. Other hard minerals are sometimes fraudulently substituted for it, to detect which, and to determine the value of the emery, the following method is employed in Smyrna:—A plate of glass of known weight is rubbed with a certain quantity of the emery until it has no further effect; the lighter the glass has become, the better is the quality of the emery. The emery diggings of the Government are on the island of Naxos. A ferruginous clay silicate has lately been discovered upon the island of Skyno, which is not inferior in hardness to emery.—*Chem. News, London, July 27, 1861, from Wittst. V. Schr.*

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*Spontaneous Decomposition of Gun-cotton.*—M. Bouet (*Comptes Rendus*, t. liii. p. 405) has remarked that the decomposition of gun-cotton in diffused light is preceded by the appearance of a reddish atmosphere, and also that the cotton prepared with nitrate of potash and sulphuric acid is sooner and more violently decomposed than that prepared with the mixed acids. The residue, he says, is also different in the two cases: that of the first is something like burnt sugar, and in the second case is of a straw color. In both cases the sides of the bottle were nearly covered with small crystals of oxalic acid, and the air contained had an acid reaction. M. Bouet demonstrated the presence of carbonic and formic acids in the atmosphere of the bottle, and he thinks it probable that cyanogen was present. No oxide of nitrogen was discoverable. The solid residue after the removal of the oxalic acid was white, and dissolved in water like gum.

M. Chevreul agreed with M. Bouet, but insisted that light was an active agent in decomposition only when air was present; and among other things he insisted on the importance of light in a sanitary point of view, the salubrity of a house greatly depending on the free admission of light as well as air.

Luca found, however, (*Ibid.* t. liii. p. 298) that gun-cotton which had been kept in the dark had undergone decomposition with the evolution of nitrous vapors. Nearly the whole of this "modified" cotton he found to be soluble in alcohol and in water—14 per cent. in the former and 78 per cent. in the latter. The products of the decomposition he intends to study further.—*Chem. News, London.*

*Blue Color from Cotton Seed Oil.*—Cotton seed oil is bleached by treatment with either carbonate of soda or caustic lime. In both cases a considerable residue is left after drawing off the bleached oil. This residue is treated with sulphuric acid, and distilled at a high temperature. There is then left, according to M. Kuhlmann (*Comptes Rendus*, t. liii. p. 444,) a compact mass of a deep greenish blue color. On further treatment of this mass with strong sulphuric acid, the green tint disappears, and a very intense pure blue color is produced. Other acids, phosphoric and hydrochloric, will bring about the same change. The blue mass is a mixture of the colored substances with some sulphuric acid, sulphate of soda, and fats. The two former may be removed by washing with water; the latter by treatment with naphtha. Alcohol now dissolves the blue color, and water precipitates it from the solution chemically pure.

According to the mean of the results of three analyses, the composition of the new body was

C 70.24  
H 8.35  
O 21.41 :

results which nearly agree with the formula  $C_{34}H_{21}O_8$ . The new matter could not be obtained crystallized.

Unhappily, M. Kuhlmann has not yet been able to dye with this color, but he does not despair of fixing it.—*Ibid.*

*Chlorate of Potash as a Remedy for Fœtid Breath.*—Many persons complain of fœtid breath who cannot attribute it to bad teeth or neglect to keep them clean; the gums and mucous membrane of the mouth are perfectly healthy. The bad odor must come either from the lungs or the stomach, and nine case out of ten it comes from the latter. In this case we have a simple, prompt and certain remedy in the chlorate of potash. Take, three hours after eating, a teaspoonful of a solution of six grammes of the chlorate in a hundred of sweetened water, and at the same time rinse the mouth with the solution.—*Boston Med. and Surg. Jour. from Gaz. des Hop.*



*Oil from Asphaltum.*—The London *Engineer* says that a prospectus has been issued inviting subscriptions for an increase of the capital of the Asphaltum Company to £200,000, or double its original amount. The business of the company, which is respectably constituted, is to work certain mines of asphaltum near Havana, for the distillation of oil, which commands a ready sale in England at apparently a very remunerative price. The outlay for the property in Havana has been £68,000, of which only £18,000 was in cash, the payment for the remainder being in shares, which are not to rank for dividend until ordinary holders have received 5 per cent. The purchase included from the Spanish Government the exclusive privilege of making oil from asphaltum in Cuba and Porto Rico for fifteen years, and as the annual consumption of oil in Cuba is estimated at £250,000, this is considered valuable. The directors, engineer and manager of the company are to be remunerated by a percentage on the profits.—*Druggists' Circular*.

*Adulteration of Camphor.*—According to the *Journal de Pharmacie d'Anvers*, gum camphor is now sometimes met with which is mixed with the artificial (hydrochloric) camphor to a considerable extent. Mr. Dumont gives as a safe reagent the behaviour of caustic ammonia towards the alcoholic solutions of such camphor.

In a tincture of pure camphor a few drops of ammonia produce a slight precipitate, which redissolves on shaking, while in a solution of hydrochloric camphor, or in a mixture of the two, ammonia gives a flocculent precipitate, which does not redissolve, and which increases in volume in proportion to the amount of such adulteration.—*Ibid*.

*Cream as a Substitute for Cod-liver Oil.*—M. Fonssagrives strongly recommends, in the *Bulletin de Therapeutique*, cream as a substitute for cod-liver oil in cases where the latter cannot be borne on the stomach. The dose for children is four teaspoonfuls at first, to be subsequently increased. It is to be taken undiluted, and sweetened or flavored with vanilla, which renders it more digestible. In England, it is taken with a little rum.—*Boston Med. and Surg. Jour.*

*For Regularly Cracking Glass,* a very expeditious plan is to use a pearl of glass melted with some soda on a platinum wire, heated before the blowpipe; the crack having been previously started with a sharp blade of first-rate cast-steel, made diamond-hard by quickly cooling.—*Chem. News, London, Aug. 10, 1861, from Dr. L. C. Levoir.*

*Papier Fayard et Blayn.*—Boil 30 parts of garlic with 500 of linseed oil, and strain, then add 60 parts of powdered sugar of lead, 30 parts of yellow ochre, and 15 of red lead, rubbed up with 500 parts oil of turpentine, and bring the mixture on satin paper by means of a flat brush. It is then dried by the stove.—*Druggists' Circular, Feb., 1862.*

## Editorial Department.

**MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.**—From all the indications that we have been able to observe, there appears to be every probability that the Association will hold a meeting the present year, and that the place will be Philadelphia. Should it be so determined, the members will be notified by a call of the President in the May Journals. Assuming that such will be the case, the chairman of the Executive Committee desires to call the attention of all those gentlemen who accepted subjects for investigation, at the New York meeting in 1860, to the fact, and to ask their earnest endeavors to be prepared to present them for reading in August next, so that the interest of the meeting may be sustained, even if the numbers that attend should be small. In a recent conversation with a member from Illinois, the opinion was expressed that the time selected, August 27, was one favorable for western men, and that the chances of attendance from his neighborhood were greatly in favor of an eastern locality, as business often called them to go East at that time. The following gentlemen accepted subjects in 1860, and will be expected to report in August next, viz.:

William Procter, Jr., Philadelphia,	Henry F. Fish, Waterbury, Ct.,
Thomas A. Lancaster, “	P. Wendover Bedford, New York City,
James T. Shinn, “	Wm. J. Watson, “
Benj. J. Crew, “	John Faber, “
William R. Warner, “	Frederick F. Meyer, “
Charles Bullock, “	Alexander Cushman, “
E. Donnelly, M. D., “	Geo. W. Weyman, Pittsburg, Pa.,
Geo. J. Scattergood, “	E. M. Blatchford, Rockford, Mass.,
Prof. Joseph Carson, “	Frederick Stearns, Detroit, Mich.,
Prof. Robert P. Thomas, “	J. L. Lemberger, Lebanon, Pa.,
Edward Parrish, “	Henry T. Cummings, Portland, Me.,
John M. Malsch, “	F. Chapman Hill, Antioch College, O.,
Thomas S. Wiegand, “	Dr. E. R. Squibb, Brooklyn, N. Y.,
Charles Shivers, “	Alpheus P. Sharp, Baltimore,
Evan T. Ellis, “	Louis H. Dohme, “
Wm. J. M. Gordon, Cincinnati,	Charles Caspari, “
Henry A. Tilden, New Lebanon, N. Y.	James Balmer, “
• Robert Battey, M. D., Rome, Georgia.	

By consulting the Proceedings of 1860, page vi., or the American Journal of Pharmacy, for November, 1860, page 514, the subjects for investigation will be found stated in full.

**SPECIMENS OF MATERIA MEDICA FOR THE LONDON EXHIBITION.**—In the November issue of this journal our readers were informed of the intention of the Philadelphia College of Pharmacy to make an effort to get together a collection of the materia medica of the United States for deposition in

the Great Exhibition at London in June, 1862. We have recently had the pleasure of inspecting the collection, now nearly ready (Feb. 16), and have been agreeably surprised at its extent in view of the short notice and unfavorable season that has elapsed since the appointment of the committee to this service. The appearance of the collection is much enhanced in beauty and completeness by the excellent glass-ware in which it is contained, which is the product of the works of the New England Glass Company. Should no mishap occur to the collection, it will certainly be an acceptable offering to the medical and pharmaceutical department of the Exhibition, and will afford a rare opportunity to study very many products of our soil that heretofore have only been known there, if at all, though the pages of the books and journals of the United States. The recent adverse action of Congress has thrown the College on its own resources to forward the collection to London.

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ST. LOUIS PHARMACEUTICAL ASSOCIATION.—A recent letter from the Secretary of this Association mentions that its condition at present is not very encouraging, but that they expect a revival with a return of better times. The following officers have been elected for the ensuing year, viz.: THOMAS SCOTT, President; JOSEPH McCULLOCH and JAMES FRANCIS, Vice Presidents; JAMES MCBRIDE, Recording Secretary; EUGENE L. MASSOT, Corresponding Secretary, and ENNO SANDER, Treasurer. The committees continued as last year. In view of the depressed condition of affairs at St. Louis, the members are willing to have the meeting of the Association held where a better attendance will mark its occurrence.

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TINCTURE OF CHLORIDE OF IRON.—The following was received too late for insertion in the proper place.

*Lebanon, Pa., Feb. 13, 1862.*

To the Editor of the American Journal of Pharmacy:

DEAR SIR,—Much has, in times past, been written and suggested about the Tincture of Chloride of Iron. Like many of my predecessors, I have frequently been disappointed in not obtaining a strictly reliable preparation made after the formula in the Pharmacopœia, with the sub. carb. of iron, as furnished by our manufacturing chemists through the city wholesale druggists. I have tried various plans as suggested by writers of previous articles appearing in your Journal, but have found none as simple and affording so reliable an article as that made strictly in accordance with our national formula—using, however, the precaution to manufacture my own subcarb. of iron, the process of which is in itself very simple.

I have had no difficulty whatever in dissolving quite rapidly in chemically pure muriatic acid, without the aid of heat, a carefully prepared subcarbonate of iron—after being properly dried and powdered.

It is quite unfortunate that the reputation of good manufacturing chemists should be hazarded by unreliable preparations that are fre-

quently met with, some of which are not so easily overcome as badly prepared and sometimes adulterated subcarb. of iron. Nothing is so convincing that such mistakes are made by them, as little *home* manipulations like the above.

Yours,

JOS. L. LEMBERGER.

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*Braithwaile's Re:spect of Practical Medicine and Surgery.* Forty-fourth part. Uniform American Edition. New York, 1862. W. A. Townsend, 36 Walker street. Pp. 382. Octavo.

The attention of our medical friends and readers is called to this valuable abstract of the periodical medical literature of the past six months.

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*Journal des Economistes ; revue de la science économique et de la statistique.* 2d série, No. 97. Jan., 1862. 36 francs per an., chaque numéro séparément 3 fr. 50.

The above noted journal has been received. It is filled with important articles. Among these are "The moral, intellectual and material condition of the operatives in the cotton manufacture," "The principal branches of mining industry in France and Belgium," "Bulletin of Financiering in France and abroad," and various other subjects relating to political economy.

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OBITUARY.—CHARLES AUGUSTUS SMITH, of Cincinnati, Ohio, died in that city on the 19th of March, 1861, of congestion of the brain, in the fifty-second year of his age. The subject of this notice has long been favorably known as a pharmacist, having for many years conducted a very reputable establishment in Cincinnati, the city of his adoption. Becoming in bad health, he retired from business and spent some time in the Atlantic States among his friends, and on the recovery of health returned to Cincinnati. Some time thereafter he, in conjunction with another party, purchased the Bluelick Springs, and undertook the introduction of that noted mineral water into general use, but the speculation proved a failure. Subsequently Mr. Smith entered the employment of Eckstein & Co., of Cincinnati, in charge of the manufacturing department of that large house. He afterwards became the editor and proprietor of "The Druggist," of Cincinnati, and so continued until the period of his decease. Mr. Smith was present as a delegate from the Cincinnati College of Pharmacy at the organization of the American Pharmaceutical Association in 1852, and has always, when present at its meetings, taken a marked interest in its proceedings. His name is known in connection with "Smith's Steam Displacer," as described in one of the volumes of the American Journal of Pharmacy.

In social life Mr. Smith possessed the esteem of a large circle of acquaintance, among whom his genial disposition has long made him a welcome and agreeable companion, and his well-known face and voice will be missed in the future meetings of our National Association.

THE  
AMERICAN JOURNAL OF PHARMACY.

MAY, 1862.

ON FERRI SUBCARBONAS.

By T. A. Rex.

(An Inaugural Essay presented to the Philadelphia College of Pharmacy, 1862.)

This is one of the most important of the numerous iron preparations, and its use as a remedial agent is very general. The U. S. Pharmacopœia directs it to be employed in making the *Tinctura Ferri Chloridi*, which is now extensively used in medicine.

That authority orders in preparing this tincture, that 6 oz. of subcarbonate of iron, one pint of muriatic acid, and three pints of alcohol, be taken. The subcarbonate is directed to be dissolved in the acid, and when effervescence has ceased, the action is to be aided with a gentle heat until all the salt is dissolved. The tincture is then completed by filtration and the addition of the alcohol.

As a large proportion of the subcarbonate of iron found in commerce will not dissolve freely when so treated, thus causing the tincture of the shops in many cases to be a very uncertain preparation, the following experiments were instituted to find which mode of conducting the precipitation and drying would render the precipitated powder freely soluble in muriatic acid.

The results of these experiments having been inspected by my preceptor, Mr. Edward Parrish, they are the more freely offered in a thesis.

*Experiment 1st.* A saturated solution of sulphate of iron, containing one part by weight of iron to two parts of cold water, was mixed with a saturated solution of carbonate of soda of the same proportions, both solutions being cold. The resulting precipitate of protocarbonate of iron was thoroughly washed

with warm water, particular care being taken in the washing to remove all the soluble salts. It was then dried between folds of bibulous paper at different temperatures; a portion at the ordinary temperature of 60° F., a second quantity at a sand bath heat of 160° to 175° F., and a third at a boiling water bath heat.

When these different specimens of subcarbonate were thoroughly dried, they were reduced to powder and treated, 45 grs. of each, with 132 grs. of muriatic acid, (which is the proportion for the tincture directed in the U. S. Pharmacopœia,) and gently heated. The acid was found to be of official strength, specific gravity 1.16.

All the specimens were soluble to some extent, but differed greatly in their respective degrees of solubility.

The portion dried at the temperature of 60° F. was much the most soluble, next in this respect was that dried at the sand bath heat, while the water bath temperature had rendered the powder still more insoluble.

To determine their proportionate solubilities definitely, tinctures were made by adding to each solution 285 grs. of alcohol, which was found to be the proportion ordered in the Pharmacopœia. These tinctures were thrown upon accurately weighed filters and the insoluble portions carefully washed with alcohol. The filters were then dried, and when weighed with the precipitates the resulting insoluble portions from the quantities used determined to be,

Residue of specimen dried at	60° F.	3.2 grs.
“ “ “	160° to 175° F.	8.3 grs.
“ “ “	water bath	9.4 grs.

*Experiment 2d.* Saturated solutions of sulphate of iron and carbonate of soda, in the same proportion as before, were mixed at a temperature of 150° F. The resulting precipitate, as in the former case, was washed carefully, and dried between folds of paper at the different temperatures of 60° F., sand bath heat of 160° to 175° F., and the water bath heat.

When dried and powdered, the different specimens were treated with muriatic acid in the proportion of 45 grs. of the carbonate to 132 grs. of acid, and exhibited generally a better degree of solubility than in the former instance. The different modes of drying, however, modified the solubilities of the

powder. The portion dried at the lowest temperature being the most soluble.

Tinctures were made of each solution by the addition of 285 grs. of alcohol, as before, and the same mode of procedure resorted to for obtaining the insoluble residues, resulting as follows :

Residue of specimen dried at	60° F.	1.85 grs.
" " "	160° to 175° F.	6.25 grs.
" " "	water bath,	8.9 grs.

*Experiment 3d.* A dilute solution of sulphate of iron, using 2 oz. to 1 pint of water, was mixed with a solution of carbonate of soda of the same proportion, both solutions being cold.

The same precautions with regard to washing the precipitate were observed, successive portions of warm water being used, until no soluble saline matters could be detected in the washings.

The protocarbonate was subjected to the three different degrees of temperature, 60° F., sand bath 160° to 175° F., and water bath, and when dried and reduced to powder was, as in the former experiments, treated, 45 grs. of each, with 132 grs. of muriatic acid. In comparing the respective solubilities of these portions, it was found, as before, that a high temperature rendered the subcarbonate more insoluble.

When alcohol was added to each solution in the proportion before used, and the insoluble residue obtained as in the previous instances, the weight in grains was found to be—

Residue of specimen dried at	60° F.	1 gr.
" " "	160° to 175° F.	6.65 grs.
" " "	water bath,	8.5 grs.

*Experiment 4th.* Diluted solutions of sulphate of iron and carbonate of soda, in the proportion of 2 oz. to 1 pint were mixed hot, at the temperature of about 200° F., and the resulting precipitate washed and dried at the three different temperatures before named.

When treated with the same proportion of acid used in the former experiments, this mode of preparation, which accords with the direction of the U. S. Pharmacopœia, was found to furnish a very soluble precipitate ; yet as in the other instances a high temperature used in drying it, rendered the subcarbonate less soluble.

To these solutions alcohol was added in the requisite proportion, filtered and washed, and the resulting precipitates or insoluble portions determined as follows:

Residue of specimen dried at	60° F.	1 gr.
“ “ “	160° to 175° F.	3 grs.
“ “ “	water bath,	5.7 grs.

To facilitate a comparison of the results of these experiments, a table of the solubilities of the several precipitates is appended, the insoluble residues being deducted from the weight used, and the result calculated into percentages.

#### SOLUBILITIES OF PRECIPITATES.

Dried at	60° F.	Exp. 1st.	Exp. 2d.	Exp. 3d.	Exp. 4th.
“	160° to 175° F.	93 per ct.	96 per ct.	98 per ct.	98 per ct.
“	water bath,	81 “	86 “	85 “	93 “
		79 “	80 “	81 “	87 “

*Experiment 5th.* As in all the above experiments, the most soluble specimen of subcarbonate, by treatment with muriatic acid, still deposited a small proportion of insoluble matter, another lot of the powder was made. In this the Pharmacopœia directions as to quantity were taken: 2 oz. of sulphate of iron, and 2½ oz. of carbonate of soda, dissolved each in a pint of boiling water. The solutions were mixed at a temperature of 200° F. The resulting protocarbonate of iron was washed thoroughly in a precipitating vessel, with warm water, the supernatant liquid at each washing being drawn off by means of a syphon, until the washings gave no precipitate with a solution of nitrate of baryta. Washing by decantation was found to be much preferable to washing on a filter.

A portion of this precipitate was wrapped in bibulous paper and dried on a sand bath, the temperature carefully kept at 80° F.; another quantity at the same temperature, but thinly spread on paper uncovered, so as to expose a large surface to the action of the air; and still another portion subjected to a sand bath heat of 180° to 190° F.

When these specimens were thoroughly dried and pulverized, they were found to differ materially in color. The low temperature gave the precipitated carbonate a light chocolate brown shade, and the high heat produced a reddish-brown approaching that of Spanish brown of commerce, both differed materially from the article usually found in the shops.



These were all treated with muriatic acid, 45 grs. of each with 132 grs. of acid, and gently heated. The subcarbonate dried at 80° F. dissolved with much effervescence, and was perfectly soluble, producing a clear solution, without a particle of cloudiness. No difference of solubility or color was observed between the two specimens dried under different circumstances of exposure, at 80° F.

The specimen dried at 180° to 190° F. was as imperfectly soluble in acid, as those dried by sand bath heat in the other instances.

While experimenting with these different modes of preparation, there seemed to be a loss of weight when a high heat was used in the drying. To determine more accurately this loss, 45 grs. of the precipitated (moist) protocarbonate of iron last described, was dried at the temperature of 80° F., and the same quantity of the moist precipitate dried at a sand bath heat of 180° to 190° F. When thoroughly dried, the portion subjected to the gentle heat weighed 15 grs. and the other only 10.5 grs.

This difference of 4.5 grs. may be attributed to loss of water of hydration and carbonic acid, which, when present in the salt, dried at a gentle heat, has a tendency to promote its ready solubility in muriatic acid.

From these various modes of preparing and drying subcarbonate of iron,—it would seem that dilute solutions mixed hot, and the resulting precipitates dried at a temperature not exceeding 80° F., make a salt freely soluble in muriatic acid. A heat higher than this, in every case rendered the subcarbonate less soluble.

From the appearance of the precipitated carbonate of iron generally found in commerce, it is not unlikely that a large proportion of it is made without regard to the officinal directions, and probably dried at high temperatures. Sometimes, no doubt, the soluble salt of iron used contains impurities, which remain in the preparation. With reference to the preparation of *Tinctura Ferri Chloridi* from precipitated carbonate of iron, there seems to be no difficulty if the officinal directions are observed, both in the preparation of the subcarbonate and the tincture. A gentle heat is described in our Pharmacopœia as between 90° and 100° F., and this is the temperature indicated for the drying of the precipitated carbonate of iron.

The London College does not indicate any temperature; the Edinburgh and Dublin indicate higher temperatures than are adapted to produce a soluble preparation.

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### ON PTELEA TRIFOLIATA.

By GEORGE M. SMYSER.

(An Inaugural Essay presented to the Philada. College of Pharmacy, 1832.)

*Ptelea Trifoliata*, or, as it is sometimes called, *Swamp Dogwood*, *Wafer-ash* or *Hop-tree*, is a shrub from six to eight feet in height, with the leaves trifoliate and marked with pellucid dots. The flowers are polygamous, greenish white, nearly half an inch in diameter, of a disagreeable odor and disposed in terminal corymbose cymes. Fruit, a two-celled samara, nearly an inch in diameter, winged all around, nearly orbicular.

This shrub is "common to this country, growing more abundantly west of the Alleghanies, in shady waste hedges and edges of woods." It flowers in June. The bark of the root of this plant is used to some extent by the "Eclectic Physicians" of the west as a tonic in intermittent and remittent fevers. This plant having been suggested to me as a subject for a thesis, and not finding any account of its having been analyzed, I determined to make some experiments with it.

*First*, a cold infusion was prepared by percolating six drachms of the powdered leaves with water, until six ounces of liquid had passed. This was of a dark brown color, had a bitter aromatic taste and an odor strongly resembling that of hops. To a portion of this infusion a solution of bi-chloride of mercury was added which produced a dirty white precipitate, and with successive portions of the infusion, sulphuric and muriatic acids each produced a precipitate; the infusion was also coagulated by heat, showing the presence of vegetable albumen.

To a portion of the infusion a few drops of tincture of chloride of iron was added, which produced a black color. To different portions were added nitrate of silver, sulphate of copper, and a solution of gelatin, all of which produced precipitates indicating the presence of tannic acid; the portion which was precipitated by gelatin was filtered, and with the filtered liquid tincture

of chloride of iron produced a greenish black color, which disappeared when the liquid was heated, showing the presence of gallic acid.

*Second.* An infusion of the fruit was prepared similar to that from the leaves. This infusion had a very bitter taste, and upon treating it as in the former experiments the result was the same.

*Third.* Two and a half ounces of the powdered fruit was treated with ether to deprive it of fixed oil, dried and treated with alcohol. To the resulting tincture, acetate of lead was added, which threw down a large quantity of coloring matter and some resin, the liquid was filtered and treated by passing sulphuretted hydrogen through it to get rid of the excess of lead, and then again filtered and heated to drive off the excess of sulphuretted hydrogen. To the liquid, yet warm, water was added in drops until it began to produce a precipitate; it was then placed on a sand bath and evaporated to a syrupy consistence; when it had cooled, it was agitated with an equal bulk of chloroform, and when allowed to rest a few minutes it separated into two layers, the watery liquid being on the top; this was decanted, and on evaporation yielded a small quantity of an extract of a very bitter taste. I made repeated attempts to obtain crystals from this extract, but without success. The chloroformic solution when evaporated gave a soft resinous substance of a slightly acrid bitter taste.

*Fourth.* Three ounces of the powdered fruit was moistened with equal parts of alcohol and water, placed in a percolater and the menstruum of alcohol and water passed through it until it was exhausted. The resulting tincture was evaporated to an extract which was of a dark brown color and a bitter acrid taste. One drachm of this extract was washed with alcohol, which dissolved out a small quantity of a soft resin which was very acrid to the taste. The same part of the extract was washed with ether; this dissolved a portion of it, and on evaporation yielded a brittle resin which was odorless and almost tasteless. The part which remained after being washed with the alcohol and ether, was principally bitter extractive matter and which had none of the acrimony of the extract.

## EXPERIMENTS ON THE BARK OF THE ROOT.

*First.* An infusion, two ounces to a pint of cold water, was prepared. A portion of it was heated to  $212^{\circ}$ , which produced a coagulum. To another portion a solution of bi-chloride of mercury was added, which threw down a dirty white precipitate. From the result of these experiments I inferred the presence of albumen.

*Second.* A portion of the infusion was treated with a solution of subacetate of lead, which produced a white flocculent precipitate. A portion of the infusion was deprived of its albumen by heat and filtered, to the filtered liquid an equal bulk of alcohol was added which also produced a white precipitate, showing there was gum present.

*Third.* A decoction was made by boiling some of the bark in water, it was filtered, and to it was added a few drops of tincture of iodine which gave a dark blue color, showing that starch also existed in the bark. A portion of the decoction was tested for tannic and gallic acids, but there were no indications of either being present.

*Fourth.* Two ounces of the bark was reduced to coarse powder and macerated in water for twelve hours, it was then introduced into a retort and distilled, which resulted in the production of a small quantity of volatile oil which was found floating on the water which passed into the receiver. The oil was separated by agitating the distilled liquid with ether, decanting the ether and evaporating it. The oil which remained was colorless, had the disagreeable and peculiar odor of the bark, and a hot, nauseous, disagreeable and very persistent taste.

*Fifth.* The dregs which remained in the retort after distillation were exhausted with alcohol; this gave a bright yellow tincture, which on evaporation yielded a fixed oil, extractive matter and resin. The oil soon separated from the extractive matter, it was decanted and it was of a light brownish color, of a mild, bland taste, and burned with a bright flame, giving off very little smoke. The extract was allowed to stand for several days, and on examination a number of crystals were observed on its surface and around the edge of the vessel. They were of a cooling, saline taste, soluble in water, and bi-chloride of platinum

gave a yellow precipitate when it was added to the solution, showing the presence of potassa. I presume they were crystals of nitrate potassa.

*Sixth.* To avoid the extractive matter two ounces of the bark was exhausted with ether, the ethereal solution was evaporated, the fixed oil which separated was decanted, and the ethereal extract washed with alcohol. The alcoholic solution on evaporation yielded a resin of a reddish brown color and beautifully transparent. The taste was disagreeable and very acrid at first, but after a short time producing a numbing sensation which lasted for a long time. The part of the ethereal extract which was not dissolved by the alcohol was also of a resinous nature, but was almost tasteless, and had none of the acrimony of the alcoholic resin. I made repeated attempts to obtain crystals from the alcoholic resin but was unsuccessful. From the result of these experiments I concluded that the bark contains vegetable albumen, gum, starch, volatile oil, fixed oil, extractive matter, a resinous substance soluble in ether, and a resin soluble in alcohol and ether, and upon which, in connection with the volatile oil, the bark depends for its activity.

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#### ON MONSEL'S SALT.

By H. T. PECK.

(An Inaugural Essay presented to the Philadelphia College of Pharmacy, 1862)

Monssel's salt is at present quite prominent among the new pharmaceutical preparations that have been introduced within the last few years. Its value in the cases for which it has been recommended seems to be well determined, and the demand for it has become considerable.

As seen in the market it presents variable appearances. Some specimens being in the anhydrous condition of a greenish yellow color, and in the form of powder or small granular masses, and others in the form of scales, reddish brown in color, containing some water—water of crystallization, if I may so call it. I have also noticed the presence of nitric oxide in several specimens.

The salt in scales dissolves readily, and forms a clear solution. The other kinds dissolve slowly and imperfectly, yielding turbid

solutions, from which there is deposited, sometimes, a considerable portion undissolved.

It is desirable that the preparation should be uniform in character, so that the purchaser or prescriber in ordering it could be certain to get a pure and soluble article, instead of an imperfect and insoluble one, such as is generally furnished at the present time.

In order to ascertain if the salt in its most perfect and soluble condition could easily be made, and what particulars had to be observed to obtain that result, I made a few experiments.

The formula I used is that given as M. Monsel's, by Prof. Procter, in the *American Journal of Pharmacy*, (vol. xxxi. p. 403.) It is essentially as follows :

Take of	Distilled water	100 grammes
	Sulphuric acid (60°B.)	10    “
	Protosulphate of iron	100   “
	Nitric acid (35°B.)	16    “

Mix the sulphuric acid and water in a pint porcelain capsule and heat to ebullition ; dissolve in it 50 grammes of the protosulphate of iron ; add the nitric acid in small portions, and when the evolution of the nitric oxide has ceased, add in portions of the remaining protosulphate of iron previously powdered. Boiling should be continued during the operation. Lastly, add sufficient distilled water to make the solution measure 100 fluid grammes, and filter.

In the first experiments made, the heat applied during the oxidizement of the protosulphate of iron was moderate. It was so applied as to not volatilize the nitric acid before it could be decomposed. This manner of operating, however, did not secure the perfect result I expected. The solutions in a few days gave off nitric oxide, and the salt in scales prepared from them, though fine in appearance at first, became, in the course of a week, opaque, and gave evidence of the presence of nitric oxide.

In several final experiments, I maintained the heat so that the solution was kept generally boiling during the process, and afterward as long as any nitric odor was perceptible. The nitric acid when added to the boiling solution was quickly decomposed ; none, I believe, escaped unchanged. The evolution of nitric

oxide was quite violent, but by dropping in the acid was controlled. The great advantage in maintaining the temperature of ebullition is, that the nitric oxide is evolved as soon as it is formed, and not allowed to become dissolved in the solution from which it is afterwards quite difficult to be thoroughly separated. A few minutes boiling at the end of the process was sufficient to render free from odor the solutions made at the boiling temperature; while those prepared with more moderate heat had to be boiled nearly half an hour before they were brought to the same condition.

The solutions last obtained, as well as scales prepared from them, have been kept more than a month, and as yet no changes have occurred in them. The solutions are clear and odorless as at first, and the scales remain transparent.

The scales were obtained by evaporating the solution to the consistence of honey, spreading it thinly, by means of a camel's hair pencil, on glass plates, exposing these over a stove to a heat of  $180^{\circ}$  for half an hour, or until the point of a knife pressed upon the salt showed it to be brittle, by causing a fracture. Then, while the plates were warm, pressing a knife edge upon the salt in lines about the eighth of an inch apart. Separated in this way, the scales were about as large as those of citrate of iron usually are. They were deliquescent, but not so much so as I expected to find them. I think they are exceeded in that respect by acetate of potassa.

Care should be taken to bottle them immediately after separating from the plates, as they are very adhesive and troublesome to manage after they have deliquesced. When exposed to a heat of about  $300^{\circ}$ , 100 grains lost 22 grains of water; 78 grains of the anhydrous salt being left.

In a dispensing establishment, it is advantageous to have a definite solution of the salt on hand, so that when a solution is prescribed, the concentrated one can be properly diluted, instead of dissolving the salt in scales or that in the anhydrous form; the former being more valuable on account of the time and trouble necessary to its preparation; the latter being so slowly soluble.

To obtain such a solution, that resulting from the process before given may be taken. By calculation it is found to con-

tain 497 grains of the anhydrous salt, or 637 grains of a salt containing twenty-two per cent of water. Now if it be made to measure 26 fluid drachms, instead of 100 fluid grammes, each fluid drachm will contain about 24 grains of the hydrated salt, or 19 grains of the anhydrous.

In making Monsel's salt, care should be taken to ascertain the strength of the acids used ; as an excess would render the preparation caustic, or give a result different from the one intended, in which there is less acid than the base is capable of combining with.

In my own case, an ordinary vial, capable of holding 1000 grains of distillate at 60° when filled to the neck, served the purpose of showing the specific gravity, and consequently the strength of the acids at my command.

#### FERRATED ELIXIR OF BARK.

By JAMES T. SHINN.

Among the pharmaceutical novelties recently brought to the notice of physicians, this preparation of Iron, Cinchona and Brandy, is one of the most agreeable and consequently may prove very popular with patients.

Where an after-dinner stomachic and excitant is required with the tonic effect of small doses of Cinchona and Iron, this Ferrated Elixir of Bark will answer admirably, one objection to its use, however, being the danger of engendering a taste for spirituous liquors.

Not being aware of the publication of any formula for making it, the following is offered as having given satisfaction.

Take of Calisaya Bark in powder No. 60,	four ounces,
Cinnamon water,	two pints.
Caraway water,	one pint.
Tincture of Fresh Orange Peel,	half-a pint.
Alcohol	half-a pint.
Brandy,	two pints.
Syrup,	three pints.
Pyrophosphate of Iron,	
(with Citrate of Ammonia) in scales,	two ounces.

Mix the caraway and cinnamon water with the tincture of



orange peel, and percolate the bark with the mixture. Dissolve the pyrophosphate of iron in the percolate, add the alcohol, brandy and syrup, and filter if necessary.

The formula for the Elixir of Bark is based upon one by A. B. Taylor, published in the Journal of 1859. When made in that manner, however, a precipitate occurs in a short time, rendering it turbid and unsightly. By treating the bark with an aqueous menstruum, and afterwards adding enough alcohol and brandy to preserve it, less of the cinchonic red is taken up, and the preparation remains clear much longer, though my experience is not yet sufficient to say that no deposit will eventually take place.

The Tincture of Orange peel is made by macerating the finely divided fresh rind in deodorized alcohol, using a pound to the quart; it is a delicious flavorant and keeps well, some now a year old being as good as at first. The object of mixing it with the aromatic waters is to remove the resulting cloudiness by percolation, and if the tincture is not on hand it would probably be preferable to rub the fresh rind with the sugar for the syrup, thereby furnishing a purely aqueous menstruum in greater quantity.

The pyrophosphate is the most suitable of all the salts of iron for prescribing with preparations of Peruvian bark, on account of its not blackening with the tannin of cinchona and its freedom from chalybeate taste. A very convenient form in which to keep it is the solution of Dr. Squibb, as given in the Journal of 1860, page 87, with the addition of a few drops of oil of cinnamon or cloves, to prevent moulding. With this the Syrup or Ferrated Elixir may be made easily and quickly.

Some of the imported article in scales became, after a time, quite insoluble in water, and required the addition of ammonia for its ready solution. Although not darkened by infusion of cinchona, the color deepens considerably on the addition of brandy, which contains tannin, derived from the cask.

The Ferrated Elixir of Bark, prepared as above, contains about one grain of pyrophosphate of iron and citrate of ammonia, and two grains of cinchona bark in a fluidrachm, and is very agreeable in taste and appearance. The proportion of iron may be increased without rendering it unpleasant.

## SYRUPUS STILLINGIÆ COMPOSITUS.

BY JOSEPH A. HEINTZELMAN.

For some time back I have received prescriptions for an Eclectic preparation, a compound syrup of stillingia, which, being unofficial, I obtained of several Eclectic druggists of the city. But of late the call has been so frequent that I now prepare the syrup by the gallon.

I first examined the recipe described in King's Dispensatory, and have found it to yield a very valuable preparation when the manipulation is rightly conducted.

Most of the ingredients of this syrup are from our own fields, growing in different localities of the United States, and physicians should be encouraged to prescribe medicines from sources near home instead of foreign substances. As it is likely to become a popular medicine, and the formula published not being without objections, I take the opportunity of offering the result of a satisfactory experiment. In examining King's Eclectic Dispensatory, I found the manipulation tedious and not strictly scientific; the measure of menstruum used is larger and more costly than necessary, and what has been gained by extraction, is lost by evaporation and superfluous boiling. Of course, if the strength of such a preparation should be estimated by its *color*, it may be called a good preparation, as it is a dark brown almost black syrup, depositing, after a time, much sugar in crystals owing to the large amount of alcohol retained, and containing little of the fine flavor, depending on the very volatile matter, which, at careful evaporation, is preserved, but entirely destroyed by long continuation of boiling.

Take of Queen's-root, (*Stillingia sylvatica*),

Turkey-corn root, (*Cordialis formosa*), each  $\bar{z}$ vi.

Blue flag root, (*Iris versicolor*.)

Elder flowers. (*Sambucus*),

Pipsissewa leaves, (*Chimaphila*), each  $\bar{z}$ iiij.

Coriander seed,

Prickley ash berries, (*Xanthoxylum fraxineum*), each  $\bar{z}$ iss.

White sugar, seven pounds, avoidupois.

Alcohol,

Water, each, a sufficient quantity,

Bruise and grind the ingredients to get the coarse powder through a sieve of 18 meshes; mix 3 pints of alcohol with 3 pints of water, and dampen the powder with  $1\frac{1}{2}$  pints of this mixture; put into a conical percolator and set aside 24 hours to macerate. Displace after expiration of that time with remaining portion of said menstruum; when it has disappeared from the surface of the mass pour on another mixture of 1 pint of alcohol and 2 pints of water and displace again. The 2 pints of water which I use as a third menstruum is to displace a portion of the remaining diluted alcohol in the mass, after which time all the active matter is taken up. Evaporate the saturated tincture on a water bath and at a temperature not exceeding  $112^{\circ}$  F. to 4 pints. Filter while hot, and if it measures less than 4 pints, add enough distilled water. Finally dissolve in the filtered liquid 7 lbs. avoirdupois white and *best* sugar; bring to syrup by boiling, skim off the coagulated substances and strain.\*

This syrup is based on different principles from that prepared according to King's Dispensatory, is permanent, answering for all seasons of the year, less expensive to the manufacturer and buyer, of a clear and rich color, peculiar but pleasant taste and odor, reminding very distinctly of the substances employed before their extraction, and speaks for itself that the virtues are taken from and retained in by the above manipulation. The syrup is recommended and used extensively as an effective alterative in syphilitic, scrofulous and glandular diseases. The dose is a teaspoonful, to be taken three or four times a day; it is

\* The author, in our opinion, has hardly done justice to the formula in King's Dispensatory. That formula is based on the fact that at least two of the ingredients owe their virtues to oleoresins. Hence the mixed powder is percolated with a strong alcohol, (76 per cent.,) till a pint is obtained, which removes the greater part of these constituents, and is reserved to the last. The ingredients yet containing alcohol are afterwards exhausted by water, and a syrup made from this solution (after distilling off any alcohol it may retain) with 6 pounds of sugar, so as to reduce it to 7 pints. To this, when nearly cold, the pint of reserved tincture is added and mixed to obtain a gallon of syrup. The turbid character of the syrup thus made is owing to the oleoresinous ingredients, which are deemed valuable, and can only be retained by submitting to this partial solution.—*Ed. Amer. Journ. Pharm.*

also prescribed combined with iodide of potassium in the proportion of 15 grains to 1 fluidounce of syrup, a teaspoonful of it taken three times a day.

NOTE.—If the ingredients for this syrup could be had in powder of at least 40 meshes to the linear inch, the amount of menstruum could be considerably reduced, and the syrup made at less expense. The practical suggestions of Professor Procter in his Essay on Fluid Extracts should be studied by every druggist. The “Swift” mill or similar mills, which *must* at present answer for pharmaceutical purposes on a small scale, and where mortar and pestle prove fruitless, are not the *practical* mills we now need. I have never been able to grind certain roots, barks, herbs, &c., to finer powder than will go through a sieve No. 18 or 20; and even then only with a great deal of labor and loss of time. To break up drugs of hard or tenacious fibres it will answer well enough, but to grind to a fine powder to go through a sieve of No. 40 or 60, we want certainly an improvement. Not long since I spoke on that subject to Mr. N. Spencer Thomas, who has planned out a mill similar to his large one, and says that the pattern has been of considerable expense to him, but he will get up a mill suitable for powdering small quantities, if he can only find a sale for it. A mill of that kind is as useful as a mortar, and will repay the cost in a short time by the saving of time and materials now idly spent.

*Philadelphia, April 5th, 1862.*

#### PHARMACEUTICAL NOTICES.

By W. PROCTER, JR.

*Tinctura Ignatiæ Composita*—*Bitter drops, (Gouttes Amères).*  
—Several physicians of this city having prescribed this preparation, and some apothecaries being unacquainted with the formula, Mr. Hubbell, who has introduced it into use, informs us that it is made by the following recipe to be found in “Dorvault’s Officine,” page 337, of which a translation is here given :

“*Bitter drops.*”

Take of spirit of wormwood,	. . .	1000 parts.
“ Beans of St. Ignatius,	. . .	500 “
“ Solution of carbonate of potassa,	15	“
“ Pure soot,	. . .	5 “

Digest these ingredients during fifteen days and filter.

This formula is taken from that of Baumé. Dose 1 to 8 drops in a bitter infusion, for flatulent colics."

The spirit of wormwood is directed by the same authority to be made by distilling together 1000 parts of leaves and tops of wormwood, 1000 parts of infusion of wormwood, and 3000 parts of alcohol, 80 per cent., until 2500 parts of distillate is obtained.

The preparation, as made by Mr. Hubbell, is a light brown tincture; hence, if the alcoholic extract of wormwood and alcohol is substituted for the spirit, as has been directed by one physician, a different preparation is obtained. A much nearer approach would be to use a spirit of wormwood made by dissolving good oil of wormwood in alcohol in the proportion of 20 drops to the fluidounce of alcohol.

*Extractum Kramerie, U. S. P.*—Having recently had occasion to prepare a small lot of this extract, it was deemed best to use the root in fine powder in a conical glass percolator. The powder was prepared by one of the best reputed powderers, and was moistened with eight fluidounces for each pound of the powder, and packed firmly on a diaphragm of lint first, and then sand. The first five pints of percolate were reserved and evaporated very carefully. The remainder, which amounted to several gallons was concentrated by itself, each till of a thick honey-like consistence, when they were mixed and reduced to a nearly dry extract. The heat employed was below 150°, and generally below 120°, and the product obtained 10½ ounces or 9-14 per cent.

This result corroborates one made several years ago, and sustains the belief that the Peruvian *Krameria* of latter years does not yield as much aqueous extract as that found in our market twenty or thirty years ago. The proportion of wood is much greater, and of cortical matter less than was then common, and it is quite unusual now to find pieces comparatively straight, that were, when fresh, evidently quite succulent, with a thick cortical portion.

*Emplastrum Ammoniaci, U. S. P.*—This preparation is a sort of acetic extract of ammoniac. It should be prepared without contact with iron, either in the form of spatula or evaporating vessel, if the operator would avoid the strong coloring

influence of acetate of iron. In a recent operation with ten pounds of ammoniac of good quality, in tears, the drug was coarsely bruised, put in a two-and-a-half gallon porcelain dish, and mixed with a gallon of diluted acetic acid. The vessel was put in a warm place, where it acquired a temperature of  $140^{\circ}$  F., and stirred with a wooden spatula from time to time until the particles became well softened, and the whole of a thick creamy consistence. It was then strained through a coarse textured muslin, such as is called "foundation muslin" by the bonnet makers. This requires to be done by hand, about a quart at a time, and is a disagreeable piece of manipulation. After the first expression, the residue is returned to the dish, again digested with six pints of diluted acetate acid until the gum resinous portion is all softened, when it also is forced through the strainer, which retains the particles of capsules and other impurities of the drug. The thick liquid is now evaporated with frequent stirring until reduced to the consistence of a firm extract, when, whilst yet soft, it should be put into suitable jars. Ten pounds of the best ammoniac yield eleven pounds of the plaster.

*Emplastrum Opii, U. S. P.*—Having occasion to prepare ten pounds of this plaster it was determined to adopt somewhat the plan proposed for the Pharmacopœia of 1860, yet not entirely the same. The quantity of plaster to be made was ten pounds avoirdupois. The ingredients employed were as follows:—

Take of Opium in mass, a quantity equivalent to 20 oz. of the powder.

Burgundy pitch, 80 ounces,

Lead plaster, 120 ounces,

Water and alcohol of each a sufficient quantity.

Having dried one hundred grains of the crude opium and ascertained its loss of weight, weigh out the quantity of opium equivalent to 20 ounces dry, cut it in pieces, and macerate it in two pints of water for 24 hours. Then express the liquid in a cloth strainer, and again macerate in two pints of water for 12 hours, and again express; mix the solutions and allow them to evaporate at a moderate heat. To the dregs of the opium add sufficient alcohol to make a semifluid mass, (about half its weight,) put it in a funnel with a sand diaphragm, and pour on diluted

alcohol until the liquid passes with little color or odor. Evaporate this tincture to a syrupy consistence, add it to the other liquid, and when the mixed extract has acquired the consistence of thick honey whilst hot, add it to the plaster and Burgundy pitch previously melted together in a suitable vessel, and stir them until a portion, on cooling, has the proper consistence.

This plaster is apt to be a little too soft at first, owing, apparently, to the absence of the insoluble portion of the opium, but it soon attains the proper consistence if the lead plaster used has been free from undecomposed oil which appears to keep the plaster too soft. The use of such lead plaster and that which contains glycerin should be avoided in making this plaster.

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#### GROUND FLAXSEED.

BY CHARLES V. HAGNER.

There are wrong impressions prevailing among some apothecaries on the subject of "Ground Flaxseed." Long experience has convinced me that the perfection of grinding flaxseed is to grind it *dry*, that is, without "raising" the oil, which can only be done on a pair of horizontal mill-stones, sharp and "dressed" for that especial purpose. This process is a cutting (if I may so term it) of the seed into particles, the stones never coming into contact; if they did, it would be a "rubbing" process, mashing a small portion of the seed, at the same time squeezing out the oil, which would so grease the remainder and the surface of the stones as to make any further grinding of it impracticable. I suppose the same thing would occur if you put flaxseed into a mortar and rubbed it, you would mash a portion of it, "raise" the oil, and so grease the remainder and the pestle and mortar that all rubbing would be in vain.

The common and most expeditious way of grinding flaxseed is by means of iron rollers; this is the method pursued in the oil mills, where "raising" the oil is no detriment. This is a mashing and rubbing process, one roller being larger in diameter, or running at a greater speed than the other; this process "raises" the oil and gives the article a greasy appearance. It is a mistake to suppose that this is an evidence of its purity, or, because of its being dry, that it is adulterated or the oil taken

from it; ground in a certain way it could easily be adulterated, one-half the oil in the other half being abundantly sufficient to give the whole an oily appearance. On the other hand, if you put some, ground dry, in a warm mortar and rub it, you will soon "raise" the oil and find it there.

By grinding the article dry it can be ground much finer, and, if necessary, sifted through a tolerable fine sieve, rejecting the chaff or hull of the seed, and it will keep much longer and better; when the oil is "raised" it will heat, mould and become spoiled, especially in warm weather.

The same difficulty of "raising" the oil occurs in grinding mustard seed, to prevent which is a nice and delicate operation; many who attempt it fail, lose one-half the article, sometimes more, and the portion they succeed in grinding is of a coarse and oily nature; after the oil is once raised it is in vain to attempt any further grinding or sifting of it.

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#### ON THE DETECTION OF STRYCHNIA AS A POISON, AND ON THE INFLUENCE OF MORPHIA IN DISGUIISING THE USUAL COLOR-TEST.

By JOHN J. REESE, M. D., of Philadelphia.

[NOTE.—This interesting paper, originally published in the American Journal of the Medical Sciences for October, 1861, is too long for insertion in this Journal, yet the importance of the subject as presented by the author, (see page 225), relating to morphia, together with the fact that Professor Thomas has re-investigated the influence of morphia in modifying the color-test of strychnia, leads us to attempt an abridgement of the more important parts of the paper of Dr. Reese. It would have been interesting if Dr. Reese had sought, more elaborately, for morphia in the cases where his results refused to respond to the test for strychnia. The point of Dr. Thomas' essay seems to be the neat manner in which, by the use of appropriate solvents, he isolates the strychnia from the morphia, and thus avoids its interference in applying the test. The well-known precision of Dr. Reese precludes the idea of his being mistaken, and hence we must attribute the failure to isolate and detect the strychnia in experiment 3d, either to the actual interference of morphia, to some peculiarity of the process of Staas' in its relation to morphia, or to some other overlooked interference.—ED. AMER. JOUR. PHARM.]

The progressive increase in the number of deaths within the last few years, occasioned by strychnia, used either for homici-



dal or suicidal purposes, is a subject demanding the careful consideration both of the toxicologist and the medical jurist; and every circumstance connected with the detection of this most potent agent cannot fail to interest the medical profession at large.

The author lately had occasion to investigate this subject closely in connection with a case of alleged poisoning by strychnia. A man was indicted at the April term, 1860, for the murder of his wife, in Perry County, Pa. Although dying under suspicious circumstances, no post-mortem examination was made until six weeks had elapsed, when the body was exhumed. The stomach and a portion of the small intestine were carefully tied, and along with the adhering pancreas were conveyed to Philadelphia, and placed in possession of Dr. Reese for chemical examination. He found the organic structure but little changed in appearance (eight weeks after death) and the contents of the vessels consisted of four or five fluidounces of a thick brownish homogeneous fluid.

Three separate analyses were made. The contents of the stomach—contents of the intestine—and the tissues themselves; each of which was carefully repeated; yet he “entirely failed to detect any evidence of the presence of strychnia, either by the bitter taste of the final extract, or by the very delicate *color-test* employed.”

Inasmuch as the *moral* circumstances of the case, and the symptoms, pointed to death by strychnia, the author naturally sought for an adequate cause to explain the failure to detect the poison. After giving due weight to the effects of elimination by the excretions during six hours that the patient survived, and to the agency of decomposing action during six weeks inhumation, the author remarks on a circumstance in connection with the case which he viewed with especial interest, namely: “the fact that the woman had taken, just before death, by the advice of her medical attendant, *a quarter of a grain of morphia*, with a little ipecacuanha; but she did not vomit. Now the value of this fact is just this: It has been ascertained that the presence of morphia and other substances has the effect of disguising and entirely neutralizing the usual *color-test* used for detecting strychnia; so that the latter might be undoubtedly present, yet if

morphia were also present at the same time, the strychnia could not be discovered. It will be readily admitted that this is a point of the extremest importance to be settled by the chemist, in medico-legal researches. It is one to which no very especial attention has hitherto been given. It is merely mentioned as a casual fact in the various works on toxicology, but the only actual experiments recorded, to my knowledge, are those published by Dr. T. G. Wormley, in the *Ohio Medical and Surgical Journal*, September, 1859, in which it is stated that when the morphia exceeds the strychnia in quantity, the possibility of discovering the latter by the color-test diminishes." Dr. Reese accordingly undertook a series of experiments to satisfy himself in regard to this very important subject with the following results :

"*Experiment 1.*—One-tenth of a grain of pure strychnia was added to about twelve ounces of water, into which were put several ounces of fresh beef, finely cut up, together with some starch, a little common salt, and a few drops of acetic acid ; (the object being to represent, as closely as possible, the contents of a human stomach after a meal.) The whole was digested on a sand-bath for twelve hours at a moderate heat. It was then strained, pressed and filtered ; and afterwards evaporated down to a very small bulk. It was next divided into two separate portions, each of which, of course, would contain the 1-20th of a grain of strychnia. One of these portions was treated after the process known as Graham and Hoffman's (the alkaloid being removed by animal charcoal, and finally extracted by ether.) Here, a drop or two of the ethereal solution, representing about the 1-40,000th to the 1-50,000th of a grain, gave distinct evidence of strychnia by the usual color-test. The second portion of the evaporated solution was divided into two parts, each of which would of course contain the 1-40th of a grain of the alkaloid. The first of these was treated according to the process of M. Staas, in which ether is used as the ultimate solvent : and the second part after the process of Mr. Prollius, in which the ultimate solvent was chloroform. In both instances I obtained the most satisfactory proofs of the presence of strychnia ; operating upon a single drop of the fluids—which would represent, certainly, not over the 1-100,000th of a grain of strychnia.

"*Expt. 2.* This was a repetition of the former experiment, except that the quantity of strychnia used was much smaller—only the 1-100th of a grain. After treatment by Staas' process, and on concentrating the ultimate ethereal solution, the presence of strychnia was manifested both by the color-test, and by the bitter taste of the extract. Here, the quantity of the poison operated upon was less than the 1-100,000th of a grain.

"*Expt. 3.* This was an exact repetition of *Expt. 2*, except that to the 1-100th of a grain of strychnia, three times that quantity of morphia (1-33d of a grain) was added. On treating this by Staas' process, as in the preceding cases, I could not discover the slightest trace of either strychnia or morphia, even after the ultimate ethereal solution was concentrated to a very small bulk by evaporation."

As the first two experiments were precise counterparts of those employed in the analysis of the stomach, the author feels justified in believing them to be delicate and reliable, and that the poison should have been isolated if present, unless its presence was masked. The *third*, he thinks, seems to prove most unequivocally that morphia, when present in excess along with strychnia, has this property of concealing the latter from the usual color-test.

"*Expt. 4.* This was also a repetition of *Expt. 2*, except that to the 1-100th grain of strychnia, the 1-50th grain of morphia was added instead of the 1-33d—or double instead of treble the quantity. Here, likewise, there was a total failure to discover the poison.

"*Expt. 5.* This was a repetition of the last, except that only 1-100th grain of morphia was added to the 1-100th grain of strychnia, or an equal portion. The result here was that I obtained the faintest possible evidence of the presence of strychnia, and only after repeated trials.

From these last experiments I think we may conclude that *the influence of Morphia in preventing the detection of minute quantities of strychnia, in the presence of an organic fluid, depends upon the relative quantity of the two alkaloids;—the strychnia being not discoverable when the morphia is in excess, and barely discoverable when in equal quantity.*"

Dr. Reese next instituted a set of experiments with a view of ascertaining the effect of morphia in disguising the presence of strychnia in *perfectly pure solutions*, free from organic mixtures, and the result pointed to the fact that the minuteness of the proportions detectible by the color-test was inversely as the proportion of morphia was increased, as will be shown in the following tabular view:

When the proportion of the two alkaloids was						
One strychnia to one morphia	he was able to detect	1-500,000th	of a gr.			
One " to two "	" " " "	1-300,000	" "			
One " to three "	" " " "	1-150,000	" "			
One " to four "	" " " "	1-100,000	" "			
One " to five "	" " " "	1-80,000	" "			
One " to ten "	" " " "	1-10,000	" "			
One " to twenty "	" " " "	1-5000	" "			

Beyond this the experiment was not pursued, Dr. Reese being satisfied that Wormley's observation, that the action of strychnia became more difficult as the proportion of morphia increased, was correct.

But an important point to be determined was, how a quantity of strychnia, almost infinitesimal, might be effected by an amount of morphia, which, though small in itself, yet bore a relatively large proportion to the strychnia : just precisely such a state of things as would be likely to be met with in an analysis of the human stomach, and to decide this Dr. Reese tried the following experiments on three half-grown-cats :

"Half a grain of pure strychnia was given to the first animal, and in eleven minutes it died in a violent convulsion. The poison was very easily discovered in its stomach, by the usual tests, on the following day. To the second animal a quarter of a grain of strychnia and the same quantity of morphia were given ; and, somewhat to my surprise, the animal was deeply convulsed in six minutes, and died very quickly. Here the morphia, so far from counteracting the toxic influence of strychnia (as might have been inferred from its opposite physiological influence,) seemed actually to have increased its effects. The stomach of the second animal was likewise examined, but I obtained scarcely recognizable evidence of strychnia, owing doubtless to the influence of the presence of the associated morphia. It will be recollected that the quantity of morphia in this case was just equal to that of the strychnia. To the third animal, the 1-20th of a grain of strychnia, and the 1-10th of a grain of morphia (double the quantity) were administered. Convulsions took place in about fifteen minutes, and death in half an hour. The stomach was examined by Staas' process, as in the other cases, but with a total failure to detect the poison by the color-test ; although the bitterness of the extract, and its decided action in producing tetanic convulsions in a number of frogs, clearly established its presence."

From all the foregoing experiments, it appears to be conclusively established, that morphia does unquestionably possess the power, when present in excess, of completely disguising the color-test of strychnia ; and this is emphatically the case when they are associated in organic mixtures, as in the contents of the stomach. Consequently this fact should always be taken into account in medico-legal investigations.

The moral evidence in the foregoing case was very strong, and although Dr. Reese's evidence entirely failed to establish

the presence of strychnia, yet his evidence of the masking effect of morphia, taken in connection with the fact of the patient having taken morphia just before death, and the strong moral evidence, caused the conviction of the accused, who subsequently made a full confession of the crime.

The remainder of Dr. Reese's paper is occupied with a detailed explanation of the best modes of applying the color-test, with the value of bitterness as a collateral test, with the physiological or frog test of Dr. Marshall Hall, and with the microscopy of strychnia, but the space at command is too small to insert it here; and the reader desirous of pursuing the subject, is referred to the original paper before noted, and to two papers in this Journal published in November, 1861.

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#### ON A SAFETY LAMP FOR LABORATORY USE.

By C. M. WARREN.

The danger attending the distillation of highly inflammable liquids, in glass retorts, over an open flame,—and other manipulations of similar nature,—as commonly practised in laboratories, has probably been felt by every one who has made such experiments. By the exercise of due precaution, the chances for accident under such circumstances may, doubtless, be greatly reduced; yet the consequences which may result from a single mishap, are liable to be so serious (as the fate of the lamented Mansfield gives painful evidence, although, I believe, he was using a metallic retort at the time of the fatal occurrence,) that it seemed to me desirable to devise means by which such experiments may be conducted with safety; especially as the chemist has so frequently to resort to protracted fractional distillation of complex mixtures of inflammable substances, as his only means by which to effect a separation.

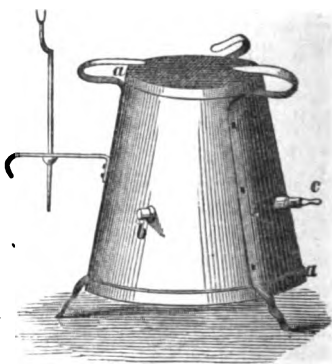
I find that a lamp may be constructed on the principle of Davy's safety-lamp for miners, so as to afford the important desideratum of safety, and at the same time combine utility and convenience for general use, in cases where a broad open flame and a diffused heat are desirable. Simple modes of applying the principle will readily suggest themselves.

It is only requisite that the flame should be properly enclosed,

and so placed and adjusted in relation to other parts of the lamp, that no part can become excessively heated, and yet so as to afford sufficient heat for any work of the kind that may be presented,—the openings below and above for the supply of air and escape of the products of combustion, being securely covered with fine wire gauze, of about 2500 meshes to the square inch. With certain slight alterations, the lamp figured under “*Gas-kochlampen*” in J. F. Lume & Co.’s, Berlin, catalogue of chemical apparatus—a medium size of which is represented in the annexed figure—makes a cheap and convenient lamp of this kind. As they may not be on sale in this country, a partial description, for the convenience of those who may desire to have them made, may not be amiss.

The sides are of a single piece of sheet iron, riveted together where the ends meet; the upper and lower edges are bent respectively upward and downward so as to stand in a good position to receive the moveable brass rings, *a a*, which serve to hold firmly the wire gauze with which the top and the bottom of the lamp are covered.

As the wire gauze will occasionally require to be renewed, this simple mode of construction seems a very convenient one, as the moveable rings may readily be taken off and replaced whenever new gauze is needed.



The tubulure, *b*,—which may be closed with a cork—serves for the introduction of a match for lighting. The nipple, *c*, communicates in the interior with a ring,  $2\frac{1}{2}$  inches in diameter, made of copper tube, and placed in the centre of the lamp,  $8\frac{1}{2}$  inches below the upper gauze, and provided with small perforations in the upper side, for the escape of the gas. The height of the lamp, between the upper and lower sheets of gauze, is  $5\frac{1}{2}$  inches; its width across the top 4 inches, and across the bottom 6 inches.

The only alterations which I have made, consist in the addition of the tubulure, *b*, and the wire gauze across the bottom.

It is obvious that they do not at all interfere with the use of the lamp as originally intended. It may still be ignited outside the gauze, so as to give a broad, open, blue flame. When used as a safety-lamp, it is, of course, to be lighted inside, and furnishes a circuit of small luminous flames, but which afford sufficient heat for any purpose for which a safety-lamp is conceived to be desirable.

To show the confidence which one may repose in the safety of such a lamp, I may add that I have repeatedly tested one by heating a fatty oil to ebullition—during which the gauze immediately under the retort would acquire a dull red heat—and then pouring boiling ether upon the different parts of the lamp, without, in a single instance, being able to ignite it outside the gauze. A portion of the ether would fall through and burn in the interior, while some would lie in the spheroidal state upon the gauze itself, until evaporated: showing, that, if one were distilling such a substance, even with such an excessive heat in the lamp, the retort might break, and its contents fall through upon the lamp without any kind of danger. A similar safety-lamp could easily be constructed for using alcohol instead of gas.  
—*Amer. Jour. Science and Arts, March, 1862.*

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#### DESCRIPTION OF A NEW FUSIBLE ALLOY.

By B. Wood, M. D.

In this Journal for Sept., 1860, will be found a notice of the cadmium alloy discovered by me, consisting of from one to two parts of cadmium, two parts of tin, four parts of lead, and from seven to eight parts of bismuth, and so exceedingly fusible as to melt below the temperature of 160° Fahr. A brief description of another alloy similar in character and scarcely less remarkable, is herewith submitted. It consists of,

Cadmium 1 part, lead 6 parts, bismuth 7 parts.

This alloy melts at about 180° Fahr., being nearly midway between the melting point of the old fusible metal consisting of the *three* metals, tin, lead, and bismuth, and that of the alloy first mentioned, consisting of the *four* metals, cadmium, tin, lead, and bismuth. It is remarkable as exhibiting the liquidifying

property of cadmium in certain combinations; also, in the fact, that while the mean melting point of the constituents composing it is much higher than that of those composing the old fusible metals, it melts at a much lower temperature,—being more fusible than any other *alloy* yet known consisting of but *three* metals.

It has a clear, brilliant metallic lustre that does not readily tarnish. Its color is a bright bluish grey, resembling platinum: when cast, its free surface presents a white, frosted appearance. It is very flexible in thin plates, and breaks with a hackly fracture; but when thicker bars are broken, the fracture is smooth, resembling that of tempered steel. It is malleable, but not perfectly so. In hardness it is about the same as bismuth, and about the same as an alloy of two parts of lead, and one part of tin, or “coarse solder,” which it resembles more nearly in other respects.

It may be that more approved methods of measuring temperature will give the alloy a still lower melting point than above ascribed to it, as I see that the experiments made by Lipowitz\* with my “fusible metal” indicate for it a much greater fusibility than my measurements.—*Amer. Jour. Science and Arts, March, 1862.*

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## ON ACETIC FERMENTATION.

By M. PASTEUR.

Pasteur has observed that the cryptogamic plants of the genus *Mycoderma* possess the remarkable property of transforming alcoholic liquids into acetic acid. The following are some of the experiments of this skilful chemist:

1. A species of mycoderm is developed on the surface of any liquid containing phosphates and albuminous matters. When the whole surface of the liquid is covered with it, the generative liquid is removed from the plant by a syphon, and is replaced by pure alcohol diluted with water. The mycoderm swells

\* Dingler's Polytechnisches Journal, clviii, 376, Lipowitz found that “Wood's fusible metal” when made of 8 parts of lead, 15 parts bismuth, 4 parts tin and 3 parts cadmium, fused at 60° C. (140° F.)—Ebs.



and covers the surface of the new liquid. The plant is thus placed in exceptional conditions, its vitality is very much impaired if not entirely extinguished. Experiment shows that the plant under these abnormal circumstances immediately establishes an action between the oxygen of the air and the alcohol of the liquid. Acetification at once commences, and is continued with great activity. It is, however, ended in about four days by the increasing acidity of the liquid. If this is replaced by a fresh supply of dilute alcohol, acetification continues.

During this operation the plant undergoes a kind of combustion, which destroys its substance. \*In this case the acetic acid and the alcohol completely disappear, and with great rapidity, the liquid becomes neutral and gives birth to divers infusorials.

To return, acetification is produced by a kind of mycoderm.

2. According to Pasteur, all which has been said upon the influence of porous bodies in acetification, is erroneous. The following experiments support this proposition:

If dilute alcohol is made to flow for a month along a cord, the drops which fall at the extremity of the cord contain no acetic acid, but if the precaution is taken of soaking the cord at the beginning of the experiment in a liquid upon whose surface is a pellicle of mycoderm, the alcohol which runs slowly along this cord in contact with the air becomes charged with acetic acid. According to this double experiment, the beech shavings used in the German process serve no other purpose than that of supporting the plant.

In the process such as is used at Orleans, the acetification, according to Pasteur, is due entirely to the almost insensible pellicle that covers the liquids in the tuns, which is formed by the smallest species of mycoderm. The *mother* of vinegar will have no other influence upon the phenomenon.

Pasteur has shown that the mycoderms in presence of sugar and not in contact with oxygen gas have the power of increasing. Their respiration in that case is probably effected by the aid of the oxygen derived from the sugar.—*Journ. de Pharm., et de Chimie*, 1861.

## ON THE VISCOUS AND BUTYRIC FERMENTATIONS.

BY M. PASTEUR.

Favre has announced that the water of barley, rice and wheat, contains a substance capable of changing sugar into a viscous matter without the disengagement of gas. Pelouze and Jules Gay Lussac, having produced viscous fermentation in the juice of the beet root have ascertained in the obtained liquid the presence of mannite and of lactic acid.

Pasteur has succeeded in isolating the vegetable ferment producing the viscous fermentation; the ferment is composed of globules arranged in circlets. The diameter of these globules varies from .0012 to .0014 millimetre. When these are placed in a saccharine liquid containing albumen in solution, the viscous fermentation is produced. 100 parts of sugar furnish about 51.09 parts mannite and 45.5 parts of gum; besides which it parts with carbonic acid. These are the results of experiments when the ferment composed exclusively of these globules in circlets is operated with. When the proportion of gum is greater than that of mannite, it is perceived that there are other globules in the liquid, larger and of a different nature. It may be possible that the second ferment transforms the sugar into gum alone, without there being any formation of mannite. But Pasteur has not yet been able to isolate this second ferment.

The liquid most prone to develop viscous fermentation can also produce the lactic or butyric fermentation, but in this case the organized beings which are developed in the liquids are of a different nature.

Pasteur has assured himself that the viscous fermentation, the lactic, butyric, &c., are always accompanied by the development of organized beings. He has already described the lactic ferment.

Neither these different vegetable ferments nor these infusoria need oxygen for their development, while the mucedines which are produced in albuminous liquids require for their development, the aid of free oxygen like the vegetables of a higher organization.

The butyric fermentation is always accompanied by the development of infusoria which increase. The life of these in-

fusoria does not require the presence of free oxygen; experiment proves even that free oxygen deprives them of life or motion. Do not these infusoria live at the expense of combined oxygen?—*Journ. de Pharm. et de Chimie*, 1861.

#### PREPARATION OF HYDROFLUOSILICIC ACID.

H. Deville prepares hydrofluosilicic acid by causing water to fall, drop by drop, upon a mixture of fragments of stone-ware and fluor-spar heated to redness in a tubulated earthen retort, or, somewhat less conveniently, by passing a current of steam through the mixture. By condensing the vapors formed, liquid hydrofluosilicic acid of about  $17^{\circ}$  B. is obtained, and this by concentration may be brought to  $29^{\circ}$  and  $30^{\circ}$  without depositing any silica, while the acid prepared in the ordinary way by dissolving fluorid of silicon in water can be brought to a strength of only about  $4^{\circ}$  and  $5^{\circ}$  before the solution becomes solid from the separation of gelatinous silica. At  $7^{\circ}$  B. a solution of hydrofluosilicic acid contains 66 grms. of the anhydrous acid ( $2\text{SiF}_6$ ,  $3\text{HF}$ ) per litre. At  $29^{\circ}$ , the maximum condensation, it contains 325 grms. per litre.

The acid of  $29^{\circ}$  is very energetic, expelling almost all the acids, excepting sulphuric acid, when heated with their compounds. Since it does not attack wood or other organic matters it may be kept in kegs. It has but little action upon vessels of stone-ware, but destroys glass somewhat rapidly with formation of fluosilicate of soda. In the opinion of the author this acid is destined to become of considerable industrial importance.—*Amer. Jour. Science and Arts*, March, 1862, from *Annales de Chim. et Phys.* F. H. S.

#### ON THE PRODUCTION OF NITRATE OF METHYL.

By M. CAREY LEA, of Philadelphia.

For the production of nitrate of methyl but one process appears to have been proposed, and that is to be found in all our text-books, English, German and French. Two parts of powdered nitre are to be distilled in a capacious flask with a recently prepared mixture of 5 parts wood spirit and 10 oil of

vitriol. Judging from the reactions of ethylic alcohol, it did not appear to me probable that such a proceeding could succeed. It was tried, however, and with the following results.

The substances were placed in a flask capable of containing twenty times their united volume, which was connected with a Liebig's condenser by a wide delivery tube. For a few minutes no action was perceptible, but it soon set in, with rapidly increasing violence. Torrents of gaseous products with deep red fumes of oxydes of nitrogen, were evolved, and presently the apparatus blew up with a loud explosion, and had not due precaution been taken with a view to a possible unpleasant conclusion, personal inconvenience might have resulted, for the 3-litre flask was shattered into very small pieces, which were thrown to a considerable distance. The quantities operated upon were small, 50 grammes of methylic alcohol and proportionate quantities of the other substances. No heat was applied.

It is scarcely probable that the gases were evolved in such quantities as to have caused the explosion. It seems more likely that the heat generated by the reaction was sufficient to raise the temperature of the interior of the flask to  $150^{\circ}$  C., at or below which point, according to Dumas, the vapor of methylic nitrate explodes.

I have had no difficulty, however, in preparing this ether by a different process. By dissolving a considerable quantity of urea or nitrate of urea in methylic alcohol, it supports the action of nitric acid with the utmost facility. The following are the proportions which I have employed.

Into a retort of the capacity of a litre, 200 c. c. of purified wood spirit are placed, and about 40 grammes of nitrate of urea are added and heat applied. When solution has nearly taken place, 150 c. c. of nitric acid free from the lower oxydes of nitrogen,\* sp. gr. 1.31, are added, and the mixture is distilled to one-third. 170 c. c. of wood spirit and 130 of nitric acid are then added and distilled to the same point. Finally, 150 c. c.

\* Freedom from the lower oxydes is an essential condition of success. That nitric acid is colorless is not in itself a sufficient indication of purity in this respect. An acid which causes the least darkening to a solution of ferrous sulphate is wholly unfit for use in the preparation of either methylic or ethylic nitrate.

wood spirit and 110 nitric acid with 10 grammes of nitrate of urea are added, and distilled to the same point as before. It is useless to carry the distillation further than the point here specified, not that it is accompanied by any inconvenience, but because nitrate of methyl ceases to be evolved. The temperature rises very high at the close of the distillation.

The operation may be carried on rapidly. We are recommended in the text-books to carry off the vapors very carefully in preparing nitrate of methyl, on account of the production of cyanhydric acid as a by-product. In chemical laboratories there is, doubtless, generally rather too little precaution taken than too much against noxious vapors; but in the present case, I have carefully examined the distillate, both in the old process, which failed, and in that which I here propose, and I could find no trace of cyanhydric acid either by the iron or the silver tests, or by conversion into sulphocyanide. Both the ether itself and the watery part of the distillate were tested. As, however, it is impossible without special analysis to know what impurities may be present in so variable a substance as commercial wood spirit, it is difficult to foresee what substances may be generated in its decomposition, but I think I am justified in concluding that cyanhydric acid is not generated by the action of nitric acid upon methylic alcohol; at least not in the presence of urea.

Treated as above described, 420 grammes of wood spirit yielded a distillate, from which by agitation with solution of salt, there separated the very large quantity of 300 grammes crude nitrate of methyl. This may be subsequently agitated with a little weak solution of carbonated alkali.

The wood spirit before use should be distilled with one-third of its bulk of very strong (almost saturated) solution of caustic soda, to decompose any acetate of methyl which may be present. This operation must be performed over the water bath.—*Amer. Jour. Science and Arts, March, 1862.*

#### AMERICAN CHROME IRON ORE.—ASBESTOS PAPER.

We have received from a correspondent in Baltimore, Mr. Oudesluis, of South Gay St., an excellent sample of the chrome-iron of that locality. It occurs in the form of small black lus-

trous granules, many of which, under magnifying power, appear to be regular octahedrons. There is no appreciable quantity of magnetic oxide of iron intermixed with the sample, nor of other impurities which would tend to lower the per centage of sesquioxide of chromium. The amount of this latter constituent as determined by Dr. Genth, is stated to be equivalent to 63 per cent. of *chromic acid*—a mode of expressing the value of the ore by the quantity of chromic acid produced on fusion with an alkali, and not that of the green sesquioxide actually contained therein. By a qualitative examination we have ascertained that the proportion of chromium must certainly be very large, and have had at the same time an opportunity of corroborating a statement made by our informant to the effect that the mineral requires long-continued fusion to separate the whole of the chromium in a soluble form. Ore of this superior description may be obtained in casks ready for shipment at the rate of about one dollar for each one per cent. of chromic acid per ton, and in quantities of about 200 tons annually. It is, however, considered more judicious to work this ore in admixture with other qualities which are produced in greater abundance,—1500 tons annually,—the average composition of such samples furnishing usually about 50 per cent. of chromic acid. The ore last described was accompanied by specimens of asbestos, and of paper containing about one-third proportion of the same. The mineral may be procured from Mr. Oudesluis at the rate of  $1\frac{1}{2}$  cents per pound,—a low price considering the high quality of the article offered. The specimen sent is beautifully white, and the fibres are long and delicate. It has been tried in America for paper-making and for the manufacture of steam-packing, in both of which applications it is said to be very serviceable. Its property of resisting heat and its bad conducting power would render this material particularly valuable in connection with steam machinery. The sheet of paper sent is a portion of an experimental manufacture; it burns with flame, leaving a white incombustible residue, which, with careful management, retains the form of the original sheet, the weight of ash amounting precisely to 30 per cent. Characters written on the paper with ordinary black ink are still legible after burning.—*Chem. News, London, Jan. 25th, 1862.*

## ON THE COLOR-TESTS OF STRYCHNIA, AS MODIFIED BY THE PRESENCE OF MORPHIA.

BY ROBERT P. THOMAS, M. D.,

Professor of Materia Medica, in the Philadelphia College of Pharmacy.

During the last few years, the attention of the profession has been attracted to the consideration of the various means which have been recommended for the detection of strychnia in cases of poisoning by that powerful agent; and some of the ablest minds of Europe, and of this country, have contributed the results of their labors to the common stock of knowledge on this important point. Having received a thorough investigation from such hands, and its relations traced in almost every possible combination or association, and the tests of its presence—both physiological and chemical—having been proved to be alike clear and distinctive, it would appear probable that little more could be added towards the perfection of its history.

Nevertheless, a question of great moment has recently arisen, as to the possibility of detecting it at all, if the poison should be associated with an equal, or a greater quantity of *morphia*, or a salt of *morphia* in the presence of an organic fluid. An able and exceedingly valuable paper on this subject was published in a late number, (Oct. 1861) of this Journal, [see page 212]; and another article on the same is to be found in the *Ohio Med. and Surg. Journal*, for September, 1859.

The property, referred to morphia when combined with organic matter, of preventing the detection of strychnia by color-tests, will, if confirmed, afford a satisfactory explanation of the difficulty experienced by Drs. A. S. Taylor, and G. Owen Rees, in their examination of the viscera of J. P. Cook, as elicited on the celebrated trial of William Palmer for his murder, in England in May, 1856. They could not detect a trace of strychnia, notwithstanding the symptoms antecedent to Cook's decease pointed unequivocally to this alkaloid as the fatal agent. If not decomposed, it must have been masked by the presence of morphia, as Mr. Bamford, the attending physician, administered half a grain of this narcotic, each night, for three successive nights previous to his decease. The circumstances of this trial, and the experiments, described in the papers referred to, furnish

an imperative reason for a further investigation of the subject; as the suicide or murderer can destroy all traces of his work, by simply combining an excess of morphia with a poisonous dose of strychnia. The former will not delay the fatal action of the latter, but on the contrary, will rather aid it.

With the view of determining the important question, whether strychnia is actually decomposed when treated with test-agents in the presence of morphia, or whether it is merely masked by such presence, I have performed more than a hundred experiments, of which an account of a few of the most valuable and satisfactory is now submitted. Premising that, in the examination of minute portions of strychnia, success or failure depends entirely upon the care given to the details. In all of my experiments I employed crystals of the pure alkaloids, and of their salts.

The "color-tests" referred to in this paper, are those furnished by bichromate of potassa, or by the ferricyanuret of potassium (red prussiate of potassa), when added to a portion of strychnia previously dissolved in a drop of strong sulphuric acid. The discrepancies in the results of the published experiments of different observers depends, I think, in a great measure, on their diverse modes of procedure, and therefore I feel justified in giving a precise account of—

*The Mode of Testing.*—In every instance the material to be tested was employed in the solid form, such as the pure alkaloids or their salts. If it existed in solution, it was reduced to a solid consistence by evaporation in a test capsule, spontaneously, or by a very gentle heat. Having thus procured a solid substance, a small portion of it was placed upon a white plate, a drop of strong pure sulphuric acid was added, and trituration was carefully made with a glass rod until the substance was dissolved. Then a small quantity of powdered bichromate of potassa, or of powdered ferricyanuret of potassium, was deposited on the plate, *near the acid mixture but not touching it*, and to the powder a minute drop of water was added—just enough to partly dissolve it—and then, with a pointed glass rod, a little stream was drawn from each of the solutions in such a direction as to cross each other. Immediately at the point of intersection the play of test-colors was beautifully manifested. When the



bichromate was employed, the sequence of colors was blue or violet, instantly changing to purple, then gradually becoming red, and finally greenish-yellow. When the ferricyanuret was used the color was a rich bluish-purple, changing rapidly to a light rose-red. It is important to proportion the sulphuric acid to the amount of alkaloid, avoiding an excess beyond what is necessary to its perfect solution; and therefore it is better to take the acid out of the bottle by a pointed glass rod, rather than to drop it from the lip.

The first series of experiments was instituted for the purpose of determining how far pure morphia or one of its salts, when combined with strychnia, would prevent the manifestation of the color-tests.

*Expt. 1.* Accordingly, equal weights of the pure alkaloids were rubbed together in a mortar and tested; next, one part of strychnia to three parts of the sulphate of morphia; then one of strychnia to four of the acetate of morphia; then one of strychnia to eight, and finally, one to twenty parts of the sulphate of morphia. In each case the result was entirely satisfactory; the color-test flashing out, with more or less distinctness in proportion to the relative quantity of morphia, as soon as the margins of the two solutions on the plate came in contact. As intimated above, one solution was made by rubbing the powdered bichromate with a drop of water, the other by triturating a portion of the morphia and strychnia with a drop of sulphuric acid, being careful to use just sufficient acid to insure a perfect solution. I did not consider it necessary to carry this experiment any further, because, in a case of poisoning in which the morphia should be twenty times greater than the strychnia, the fatal result and the attendant symptoms would probably be more characteristic of the action of the former than of the latter, and our experiments would be devoted to its detection.

*Expt. 2* was an exact duplicate of the first in all of the varied strengths of the two articles, with the simple difference of having them in solution in water acidulated with acetic acid, instead of being in the solid form.

To obviate the necessity of a subsequent concentration of the solutions by heat, the salts or alkaloids were macerated in small measures only, of acidulated water, and to each solution an ex-

cess of a solution of potassa was added, and then an equal measure of chloroform, which dissolved out the strychnia, and subsequently yielded it as a filmy deposit in a capsule, by spontaneous evaporation.

With sulphuric acid and bichromate of potassa, the proper test-color was manifested by the deposit in each case.

In my opinion, these experiments determine conclusively that strychnia can be detected by color-tests, even when masked by morphia—either as the alkaloid or one of the salts—to the extent of twenty times its own weight.

But the question raised is not so much, whether strychnia will be masked by pure morphia or its salts, uncontaminated with anything else, as whether *morphia in the presence of organic mixtures* has the power of preventing the recognition of strychnia by the usual color-tests. To determine this latter point, my attention was directed in the next instance, to the devisal of a simple and practical method, by which its recognition could be secured. Upon reflection, I concluded that the most feasible plan of overcoming the difficulty, would be to separate the poison entirely from the organic mass, by chemical agents and solvents.

After careful investigation and repeated trials, I selected as the agents the three fluids used in experiment 2. These fluids can always be obtained at trifling cost, of easily ascertained strength, and of known purity. They are, 1. Acetic acid, of the specific grav. 1.041. 2. A solution of one drachm of caustic potassa in a fluidounce of water. And, 3. Chloroform.

Acetic acid was chosen, because, when in excess, it has the property of dissolving all of the ordinary salts, both of morphia and strychnia, as well as their tannates, which are generally described as being insoluble; and, therefore, by treating an organic mass containing these alkaloids with this acid, we would obtain a solution of the acetates of morphia and strychnia.

The solution of caustic potassa was selected for several reasons. For instance, in neutralizing the acetic acid it forms a soluble salt of potassa—thereby getting rid of the acid when we are done with it. It saponifies the fats of the organic materials; it decomposes their sugars; and it dissolves morphia, but does not dissolve strychnia, thus enabling us to separate the one alkaloid from the other by its agency.

Chloroform was resorted to, for its solvent and volatile properties. Thus, 100 parts of it, according to M. Pettenkoffer, at ordinary temperatures dissolve 20.16 parts of strychnia, and only 0.57 parts of morphia. A fluidrachm of it, holding the strychnia in solution, will evaporate spontaneously in a few minutes if placed upon a saucer or plate.

As the solution of potassa dissolves morphia and rejects strychnia, while chloroform has the reverse property of taking up the strychnia and rejecting the morphia, it must be evident that the conjoint use of these fluids would effect an entire separation of the two alkaloids—the morphia being held by the potassa, and the strychnia by the chloroform.

Another important practical advantage in the use of these fluids is found in their different specific gravities. The chloroform, being the heavier, sinks to the bottom of the vessel containing them, and thus a separation is easily accomplished.

The eliminating properties of the three fluids were determined in the following way:—

*Expt. 3.* One grain of strychnia and three grains of opium were macerated for three days in a mixture of equal measures of acetic acid and water; then filtered, and to the clear liquid equal bulks of the caustic solution and chloroform were added, and the whole well shaken together. Upon subsidence, the chloroform was separated, and a part of it evaporated on a plate. The deposit, thus obtained, was treated with sulphuric acid and the bichromate of potassa, in the manner before described, when a fine play of test-colors resulted.

In this and the subsequent experiments, care was always observed to have the caustic solution in sufficient excess over the acetic acid to dissolve the morphia, and leave the solution alkaline to test paper.

Having thus determined the practicability of regaining the strychnia, in a separate state, from a solution in which it had been associated with the various alkaloids of opium, I proceeded, in the next instance, to the examination of its relations to morphia in the presence of organic matter. For this purpose a nutritive mass was prepared as the representative of the contents of a man's stomach, if death should occur soon after a meal. The mass consisted of two ounces of minced-meat (such

as is used for pies, and containing meat, suet, various dried fruits, cider, spices, and a little brandy), two ounces of bread, a portion of salt, pepper, and vinegar, and two fluidounces of a strong infusion of coffee, well-sweetened. In other words, an association of the nitrogenous and non-nitrogenous elements of food, with spices, alcohol, tannic acid, and caffen. To this mass, one grain of strychnia and five grains of morphia, which had been previously well triturated together and dissolved in a mixture consisting of one fluidrachm of vinegar and 15 fluidrachms of water, were now added, and the whole carefully mixed.—The mixture was set aside for twenty-four hours to permit the alkaloids to permeate the entire mass, and it was then divided into four equal parts. Each part being made the subject of an experiment, as follows:—

*Expt. 4.* The first portion, containing one quarter of a grain of strychnia and one and a quarter grains of morphia, was treated with  $\text{f}_{3ij}$  of acetic acid (1.041), and  $\text{f}_{3iv}$  of water. The mixture having been allowed to stand for sixty hours, was raised to the boiling point and ebullition was maintained fifteen minutes. Having been strained and filtered, equal quantities of chloroform and the caustic solution were added to the filtered liquid; the whole were well agitated together, and after subsidence, the chloroform was separated and evaporated. Upon treating the deposit with sulphuric acid and ferricyanuret of potassium the distinctive play of colors appeared.

This experiment proves that strychnia is not decomposed by a heat of  $212^{\circ}$ , maintained for a short period, even though morphia and organic matter be present. The elevated temperature is objectionable, however, from the large amount of starchy matter dissolved by the boiling water, which clogs the subsequent steps of the process.

*Expt. 5.* The second portion, containing the same amount of alkaloids as the preceding, was macerated twelve hours in  $\text{f}_{3ij}$  of acetic acid, and  $\text{f}_{3ij}$  of water, then strained with pressure and filtered. The resulting liquid was treated with equal measures of chloroform and the caustic solution. The deposit from the evaporated chloroform yielded the proper colors with the test-agents.

This, like many subsequent experiments, proves that it is un-

necessary to employ heat; acetic acid, mixed with an equal measure of cold water, being amply sufficient for the extraction of alkaloids from an organic mass.

*Expt. 6.* The third portion was macerated, like the preceding, for twelve hours, in acetic acid diluted, and then pressed and filtered. The resulting liquid was placed in a capsule before the register of an ordinary house-furnace, and was evaporated to a syrupy consistence by the warm air passing over its surface. To this, the chloroform and the solution of caustic potassa, in equal measures, were applied, and all well mixed. The separated chloroform yielded a deposit which was proved to be strychnia by the test-agents.

By this experiment, we learn that a solution containing both alkaloids in contact with organic matters may be evaporated, by a moderate heat, almost to a solid consistence, without their decomposition.

*Expt. 7.* The fourth portion was set aside for twelve days in a room having a temperature of  $68^{\circ}$  to  $70^{\circ}$ . At the expiration of this period, the mass had become sour and offensive, and was spotted with crusts of mould. It was then macerated for twelve hours in a mixture of f.3ss of acetic acid, and f.ʒjss of water. After which it was strained, filtered, and evaporated, like the preceding, to the consistence of syrup, by the passage of a current of warm air over the surface. As the resultant liquid was intensely sour as well as bitter, I added two measures of the caustic solution and one of chloroform, and agitated the mixture as in former cases. When the chloroform was separated, and a part of it evaporated in a capsule, the most beautiful and distinctive colors appeared after the employment of the proper tests.

This experiment was instituted for the purpose of ascertaining whether strychnia is liable to undergo any change in the presence of organic matter by the lapse of time, even where that matter has fermented and exhibited evidences of incipient decomposition. The result affords a strong inference that it could be detected in the contents of the stomach after a body had been deposited several days in the grave.

I carried this experiment a step further with a view of determining whether morphia could also be regained from an organic

mixture in a state of commencing decomposition. Consequently, after separating the chloroform and caustic solutions from each other, I added acetic acid to the latter, drop by drop, until it was neutralized. Then a solution of tannic acid was added, and the precipitated tannate was collected and dissolved in acetic acid. The solution afforded a red color with nitric acid, and a rich blue color with the persulphate of iron, and was, moreover, very bitter to the taste. Thus establishing, conclusively, the presence of morphia.

Having entirely satisfied my own mind, by the foregoing experiments, that no inherent difficulties exist in the detection of strychnia by the color-tests when it is associated with morphia and involved in a great mass of animal and vegetable matters, I might with propriety dismiss the subject. But as so large a quantity as a grain of the poison might not be found in the stomach after death, in consequence of the use of emetic remedies, or the partial absorption of what had been swallowed, I concluded to try the process on a much smaller scale, and accordingly performed, as follows :—

*Expt. 8.* Two ounces of minced-meat (similar to that used in experiments 4, 5, 6, and 7), and two ounces of bread, were macerated eight hours in four fluidounces of water, holding in solution one-hundredth of a grain of strychnia, and one-thirty-third of a grain of the sulphate of morphia.\*

Half a fluidounce of acetic acid, with an equal measure of water, was added, and the mixture set aside for six hours. It was then strained, with pressure, and filtered. The remaining clear liquid was divided into two portions, *a* and *b*.

One portion (*a*) was placed in a capsule in a current of air at 70°, and thus evaporated to a syrupy consistence. It was treated with the caustic solution and chloroform, as in the former cases; and, upon careful application of the tests to the film obtained by evaporating the chloroform, clear and undoubted

\*These minute quantities were obtained with great accuracy by dissolving one grain of the former, and three grains of the latter, in fifty fluidrachms of water, acidulated by a few drops of acetic acid. Half a fluidrachm of this solution contained gr. 1-100th of strychnia and gr. 1-33th of the sulphate of morphia.

evidences of the presence of the poison were afforded by a transient yet distinct play of colors.

The other portion (*b*) was treated directly with a measure of chloroform and two measures of the caustic solution. After mixing these carefully together, the chloroform was drawn off, placed in a capsule, and evaporated spontaneously. A very delicate filmy deposit, of a white color and bitter taste, was observed in the capsule. A part of this gave, with sulphuric acid and ferricyanuret of potassium, a distinct but evanescent change of colors, indicating positively the presence of strychnia.

To determine more satisfactorily the precise nature of the deposit obtained from this experiment, I evaporated, upon a slip of glass, drop after drop of the chloroformic solution, until an appreciable deposit was procured, and to this a drop of dilute nitric acid was added. When dry, it was placed under a microscope at a magnifying power of 100 diameters, and a crop of well-defined crystals of the nitrates of strychnia and brucia was apparent.

This experiment proves conclusively that strychnia in minute quantities can be regained from organic mixtures, notwithstanding the presence of three times its weight of sulphate of morphia.

In conclusion, I may be permitted to offer to those who shall be called upon to determine the presence or absence of strychnia in cases of suspected poisoning, a few practical suggestions, viz:—

1. In testing for minute portions of the poison, success or failure depends entirely upon the care given to the details of the process.

2. In examining the contents of a stomach, the employment of heat is not required for the detection of strychnia, nor should any unnecessary fluid be added which might require subsequent evaporation. Equal measures of acetic acid and cold water, in sufficient amount to thoroughly acidulate the mass, are all that is requisite to extract any alkaloids or their salts that may be present, and, to insure success, these must be reduced to the solid state.

4. In the application of reagents for the production of the color-tests, care should be observed not to add any more sul-

phuric acid to the strychnia than what is necessary to dissolve it; and, in like manner, the powdered bichromate of potassa, or ferricyanuret of potassium, should only be moistened, as by touching a glass rod with the point of the tongue and then rubbing it over the powder. In this manner, two saturated solutions or mixtures are obtained, which show the play of colors as soon as their margins are brought into contact, even though the quantity of alkaloid present be very minute.—*Amer. Journ. Med. Sci., April, 1862.*

### CONTRIBUTIONS TO THE HISTORY OF NAPHTHALINE,

By M. J. PERROZ.

After reading M. Roussin's interesting communication,\* on an artificial colored product, said to be identical with alizarine, I think I ought to make known to the Academy the results I obtained two years ago, while studying, with M. Martel, the derivatives of naphthaline.

Starting from the fact, established by us, that a mixture of commercial nitre and sulphuric acids, even in very variable proportions, will, when heated with naphthaline, readily yield colored products, we have naturally been led to examine the action of concentrated sulphuric acid on the various nitrogenized compounds of naphthaline.

This is a very difficult study, however simple it may at first sight appear, because the least changes of the condition under which the experiment is performed, exercise a sensible influence on the results. The dye principle formed, possesses the property of madder in dyeing mordants; its color varies from red to blue, and passes through all the shades of violet.

The blue was only obtained accidentally; and we are unable to state the precise conditions of its formation, though it appears to be due to a molecular change in the nitrogenized naphthaline compound, under the influence of a physical agent.

As the violet-blue tints are the most beautiful, we have devoted most of our attention to them, and have endeavored to produce them; thus working in an opposite direction to that of

\* See page 553, vol. ix., 3d series Am. Jour. Pharm.



M. Roussin, who is chiefly occupied with the reds. We soon found that binitronaphthaline, heated with sulphuric acid only, was best suited to our purpose. In his last communication to the Institute (*Comptes Rendus*, vol. lii. p. 1033,) M. Roussin says:—"By making concentrated sulphuric acid react on binitronaphthaline, no reaction takes place. The binitronaphthaline is completely dissolved, when the mixture is heated to 250°, and the liquid takes hardly an amber color. After boiling for a long time, the concentrated sulphuric acid began to react on this substance." Binitronaphthaline resists the action of sulphuric acid at a very high temperature, however, at about 300°; the color of the solution, at first slightly yellow, deepens more and more, becomes cherry-red, and finally brownish-red, beginning at the same time to disengage a small quantity of sulphurous acid. The progress of the operation is easily followed by taking up occasionally a drop of the liquid with a rod, and dropping it into a glass of water. Thus at first a white milky precipitate is obtained, then a light violet; and, finally, when the color is completely developed, a dark violet.

The substance is then taken from the fire, and left to cool, when it is poured into a proper quantity of water and boiled. The liquid, filtered whilst hot, is of a deep red color, and deposits part of the coloring matter in a flaky state. Alkalies change it to a violet red; and even when cold, silk was easily dyed violet by it. After being properly saturated with alkalies, and finally with a little chalk, it dyed mordanted cotton tissues with different shades, varying from lilac to black. The lakes with alum, tin, and lead for a base, are violet; those with iron for a base were olive, and sometimes reached to black.

In fact, this solution does not seem to alter even during any length of time, in presence of sulphuric acid; though, when in contact with air and excess of ammonia, it changes to brown in a few hours, depositing a black powder, which becomes blue when dissolved in alcohol, and red in acids.

The black mass proceeding from the precipitation of the sulphuric solution by water, contains a large quantity of coloring matter, which we were able to separate by means of M. Payen's digesting apparatus. This coloring matter has a beautiful gold reflection, is very soluble in alcohol and pyroligneous acid; but

very little soluble in water, ether, benzol, and bisulphide of carbon. As we have before said, it has many chemical analogies with alizarine. In fact, according to whether a bath is slightly acid or alkaline, we can dye the iron mordants to the exclusion of alum mordants, and reciprocally. Moreover, the dyed tissues bear brightening with soap, carefully done, that is to say, progressively. Finally, the coloring matter readily sublimates under the influence of a high temperature.

It is evident, then, that with binitronaphthaline and concentrated sulphuric acid only, without making use of a reducing agent, as M. Roussin has done, a coloring matter may be obtained with marked analogies to alazarine in its chemical properties; however, the observations I have made during my operations, have led me to doubt whether it is possible, even while obtaining perfect red tints, to prepare in this way a coloring matter identical with that of the madder.—*Chem. News, London, Jan. 11, 1862, from Comptes Rendus.*

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#### GROWTH OF CINCHONA IN INDIA.

Dr. Anderson has returned to Calcutta from his mission to Java, with the large number of 412 cinchona plants of three species, and with half a million of seeds. The cultivation of cinchona in Java, which began with 139 trees in 1855, has hitherto been most successful, but the Dutch do not possess many specimens of the variety whose bark yields the largest proportion of quinine. Dr. Anderson was enabled to supply them with some of the best specimens in return for their liberality and courtesy. Of one species the Dutch have now no less than a million of plants, and of two or three others they possess several thousands. In June, 1857, the whole number they had was only three hundred, so rapidly have they propagated themselves. The well known German naturalist, Dr. Junghuhn, is in charge of the plantations, and he was recently joined by Dr. de Vry, a chemist not unknown in England to the members of the British Association. The Report of the first of these gentlemen, now before us, details, with scientific prolixity which we shall not inflict upon our readers, the various steps of the experiment. Southwest of Tjibodas, 4,100 feet above the sea, in

the very centre of Java, natural forests extend for miles, the soil consisting of loosely heaped blocks of trachytic lava. To this spot, under the shade of wide-spreading branches, the plants which had withered in a more exposed locality, were transferred in October, 1857. Six months after, they begun to die in their new habitation, and the cause was soon discovered in a small beetle of the "bostrichus" species, never before seen in the Java forests, which deposited its brood in the trunk. After many difficulties and experiments with soils and localities, the Malawar mountains have proved the best spot. The slightest differences of altitude, light, and temperature, affect the *calisaya* variety. The hardiest, though least valuable, is the *lucumaeifolia*, but if the former be planted early in good, loose forest soil, and moderate shade, particularly in the region of from 5,000 to 5,700 feet above the sea, it grows up as tall and luxuriantly as any. Each capsule of each plant contains an average of twenty-five seeds. One *calisaya* yielded 485 capsules and each good plant may be said to yield 1,300 seeds. Of 2,000 well developed seeds sown with care on cleared soil under the shade of trees, only one grows to a real plant; for the slightest touch, even of a drop of water, or a crawling worm, kills the root of the young germ. At first the plants grow slowly, but after two years they are two feet high, and then shoot up with great rapidity if raised from seed. The plants thus successfully introduced, an important question arises—Will they yield as much quinine as in their native home in Peru? To test this Dr. de Vry was sent to Java, and he records with no little triumph how, on the 21st of July, 1858, two and a half years after the first plants were introduced, he was enabled to produce a pure white crystallized quina alkaloid from the bark of one of those stems which the beetle had destroyed. Soon after he obtained from a *calisaya*, not five years old, the same per centage of quinine which the Bolivian trees yield, or 3.12. At the end of 1861, the experiment in Java, only six years old, has thus succeeded most completely. Many of the trees are now thirty feet high.

This is full of hope for India, where the plant is now being grown under exactly the same conditions. The total number of plants is 5,847, and more than half are of that red bark variety which is most valuable, the dry bark selling at from 2s. 6d. to

8s. 9d. per lb. Rich as are the forests of Bolivia, from which the world draws its sole supply at present, they will not last long. Formerly the trees were every where found around the inhabited parts of the region, but now to meet with one of a tolerable size it is necessary to penetrate several days' journey into the forest. What India is doing as a substitute for North America in rice and cotton, she must become for South America as an exporter of quinia bark. We believe a nursery will soon be established on Khasai Hills. In less than ten years India should supply herself with all the quinine she needs. In a few more, sulphate of quinine as well as quinia bark, should bulk largely among her exports.—*Med. News, from Friend of India.*

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#### A QUICK AND EASY METHOD OF PREPARING SULPHATE OF CADMIUM.

This method, adopted by the author, is nothing more than the application of the fact observed in 1792 by Richter, that a metal plunged in a saline solution substitutes itself for the metal, which forms the base of the salt employed. A quantity of crystallized sulphate of copper, say 100 grammes, is dissolved in water, and a piece of cadmium, rather more than is necessary to saturate all the sulphuric acid, or in this case more than 44.59 grammes, is plunged into the solution. The whole having been allowed to stand for some time, the precipitated metallic copper is then separated by filtration and the liquid slowly evaporated. If during evaporation the neutral solution of sulphate of cadmium should deposit a small quantity of sesquioxide of iron, which not only constitutes an impurity, but gives the salt a bad appearance, it is necessary to expose the solution to the atmosphere until all the iron which it may contain has been eliminated, which is accomplished when after a second filtration the transparency of the solution is no longer disturbed. To obtain finally the sulphate of cadmium in well-formed crystals, it is necessary to acidulate the solution slightly with dilute sulphuric acid.—*Repertoire de Pharm. from Journ. Md. Col. of Pharm.*

## ON THE ORIGIN AND PROGRESS OF THE PHOSPHORUS AND MATCH MANUFACTURES.

By G. GORE.

(Concluded from page 155.)

The latest improvement of note in the manufacture of matches is that of M. Lundstrom, of Jonkoping, in Sweden. It consists in dividing the ingredients of the match mixture into two separate compositions, one being placed upon the ends of the splints as usual, and the other, which contains the phosphorus, being spread in a thin layer upon the end or lid of the box. The patentee uses the following mixture for the splints:

Chlorate of potash	. . .	6 parts.
Sulphide of antimony	. . .	2 to 3 "
Glue	. . .	1 "

and the following for the friction surface, which has been previously made rough by a coating of glue and sand:

Amorphous phosphorus	. . .	10 parts.
Sulphide of anatomy or peroxide of manganese	. . .	8 "
Glue	. . .	8 to 6 "

By this method the danger of fires arising from ignition of the matches by friction is avoided (because the matches will ignite by rubbing upon no other surface besides the prepared one); and that of poisoning is totally prevented by using the red or innocuous variety of phosphorus.

There is scarcely any manufacture of which the statistics appear more fabulous than that of match-making. To begin with England, in which the manufacture is comparatively small. The firm of Messrs. Dixon, Newton Heath, employ about 300 workpeople on the premises, and upwards of 100 at their own homes. Their stock of timber is generally of the value of about 8000*l.* or 10,000*l.* They consume 1 ton of sulphur per week, in the sulphuring of splints; and in twelve months they use between 4 and 5 tons of chlorate of potash, and 12 tons of glue. They produce about 43,000,000 of matches every week, or 2,160,000,000 matches yearly; reckoning the length of a match

at 2½ inches, the total length of these would far exceed the circumference of the earth. In London a single saw-mill cuts up 400 large timbers annually to make splints for matches. It has been estimated that from 12,000 to 15,000 gross of boxes of matches are produced weekly in London, indicating a production of 5,000,000,000 of matches yearly in that city. And another calculation has been made that the whole length of waxed cotton wicks consumed by one London manufacturer in the production of "Vestas" would be sufficient to reach from England to America and back again. One pound of phosphorus is sufficient for tipping 1,000,000 of German matches, or for 600,000 English ones.

The yearly consumption of phosphorus in the manufacture of matches in this country has been estimated at 6 tons, which, at a price of 2s. 6d. a pound, amounts to a value of 1680*l.*; and of chlorate of potash, 26 tons. A single merchant of London imports 8000 cwt. of cases of matches yearly. In 1854, 20,000*l.* worth of matches came into this country from the city of Hamburg alone. We import at the present time at least 1500 tons of matches a-year from Sweden only. It has been estimated that 60,000*l.* worth of matches are imported yearly into Great Britain,—equal to 200,000,000 of matches daily; and that our daily consumption approaches the enormous number of 250,000,000, or more than 8 matches each day for every individual in the kingdom. In Belgium, the consumption of matches has been calculated to be 9 matches per day for every living person.

In France, the manufacture of matches is very extensive. Paris alone employs 1,000 operatives, and produces 990,000,000 of boxes, worth in total 7200*l.* yearly. In Sweden there are 6 or more manufactories of matches; in one of them, in 1848, there was employed about 400 workpeople, and produced between 8,000,000 and 10,000,000 of matches daily.

But the greatest seat of match-making is located in Austria, where there are numerous manufactories which produce many millions per day of phosphorus matches: for instance, those of M. Pollak, at Vienna, and M. Fürth in Bohemia, consumes together about 20 tons of phosphorus annually, and give employment to about 6000 persons; and as one pound of phosphorus

suffices for upwards of 1,000,000 of their matches, those two makers alone produce the amazing number of 44,800,000,000 of matches yearly. In the year 1849, there was exported from the port of Trieste alone nearly 200 tons of lucifer matches, and the whole produce of matches in Austria in that year was estimated at 2500 tons.

The cost at which both boxes and matches are produced is equally startling. M. Fürth "sells his cheapest boxes at one penny per dozen, each box containing 80 matches." Peter Harrass, of Suhl, in Prussia, sells his plain boxes at twopence per 100, and 1400 splints for one farthing. And De Majo, of Moravia, "sells a case of 50 boxes, each containing 100 lucifers, for fourpence."

Notwithstanding the great and universal advantages conferred upon mankind by the introduction of phosphorus into the manufacture of matches, it is not without some serious drawbacks. It produces a most painful disease, which attacks the jaw-bones of the workpeople, and causes them to decay, until, in some cases, they are entirely destroyed. The disease only attacks the operatives who are exposed to vapors arising from the match composition,—chiefly those who dip the splints, also those who are occupied in drying, cutting, and boxing the dipped matches. The workmen employed in other parts of the manufacture are wholly unaffected. The disease has been fearful in Germany and France, where so much phosphorus is used in the match composition, so much so as to excite the attention of the Governments of those countries; but it has not appeared to so great an extent here. It may be considerably, if not entirely prevented, by particular attention to cleanliness and ventilation, which has been already proved in the establishment of Mr. Hynam, of London; the most effectual remedy, however, would consist in the use of amorphous phosphorus instead of the ordinary variety. It is to be remarked, that in the manufacture of the phosphorus itself, the experience of many years has shown an almost complete immunity from any symptom of the disease; this may be partly attributed to the fact that the substance is kept covered with water from its first production to the vessels in which it is finally packed for sale.

Another great disadvantage is, that ordinary phosphorus is

highly poisonous, and several instances are upon record where children have been killed through sucking the composition from the ends of matches. It might be also used for intentional poisoning, especially as phosphorus exists naturally to a large amount in the tissues of the human body; and phosphorus introduced into the stomach becomes gradually converted into phosphoric acid, which cannot readily be distinguished from that naturally present. The amorphous variety could not produce poisoning either by accident or intention, for Dr. De Vry, of Rotterdam, has administered it in various doses to animals without producing any ill effects.

Conflagrations have also frequently resulted from ordinary phosphorus matches, which could not possibly have occurred with the matches made with amorphous phosphorus under the patent of M. Lundstrom, already mentioned. In the records of fire insurance, we find that calamitous fires have been produced by cats knocking down boxes of matches, and by rats gnawing the ends of matches.

Let us endeavor to draw a useful lesson from the facts we have recorded,—not to despise or think lightly of the abstract facts or “small beginnings” of philosophers, but rather to foster them; sooner or later, they may become of value to ourselves or our successors. Who would have thought that the curious, stinking, unctuous, luminous wax of Master Brandt would ever have become so important and universal an agent of civilization? That great modern innovator, the scientific faculty of man, has, by the certain process of experiment and induction, so immensely improved the means of producing phosphorus, and so marvellously adapted its properties to the uses and requirements of domestic and general life, that it has extended the civilizing and ameliorating influence of the lucifer match to the uttermost ends of the earth. The matches of London, Manchester, and Vienna, are to be seen in the wigwam of the far-west Indian, the bush dwelling of the Australian, the habitation of the Mussulman, the frozen hut of the Greenlander, the hovel of the peasant, and the palace of the Emperor. Everywhere, as commerce extends its boundaries into newly-discovered regions, it is one of the first articles of civilization which is introduced.—*Chem. News, London, Aug. 17, 1861.*



ON THE EMPLOYMENT OF ARSENIURETTED ALCOHOL FOR THE  
PRESERVATION OF OBJECTS OF NATURAL HISTORY, ESPE-  
CIALLY INSECTS.

By M. LEPRIEUR.

At the ordinary temperature pour 500 grammes of rectified alcohol, weighing at 94 per cent., on an excess of opaque arsenious acid. After eight hours of contact, during which time the liquid is frequently shaken, the alcohol is filtered. Upon evaporating 200 grammes of the solution in a platinum capsule over a water-bath, a residue is left weighing 00.3 grammes, or 0.15 grammes per kilogramme. On employing alcohol at 85 per cent. a residue is left of 0.102 grammes, or 0.51 grammes per kilogramme. If the alcohol at 85, and the arsenious acid, are kept in contact for four months, the residue weighs 1.38 grammes per kilogramme.

To be as energetic and complete as possible, the action of the arseniuretted alcohol should take place on tissues very recently deprived of life; it is, consequently indispensable in the case of insects, for example, that they should be immersed in it whilst still alive, or, better still, after having been asphyxiated with the vapor of ether, chloroform, or benzole. Some of them, indeed, must not be immersed living in even pure alcohol, for as soon as they touch the liquid they open their elytra and spread their wings as if they wished to fly away.

Almost all the coleoptera, the hemiptera, and even the orthoptera, can be plunged without danger into the arseniuretted alcohol, provided they are not left in longer than ten or twelve hours; after this time they must be taken out of the alcohol and thrown upon blotting paper, then they are to be pricked or cemented down until they have lost by evaporation the greater part of the liquid.

When the insects have been allowed to dry before being plunged into arseniuretted alcohol, the action of the latter is not so efficacious; when a collection is much attacked by larva, recourse must be had to an immersion for twelve hours.

Of all the methods which have been proposed to preserve collections, this is, according to M. Leprieur, the best. He has

employed arseniuretted alcohol for twelve years, to the exclusion of all other means and with uniformly good results.

It follows from M. Leprieur's experience that living insects, plunged into arseniuretted alcohol, and removed after remaining there for twelve hours only, increase in weight, by about one-fourth; insects, therefore, preserve in their organs an amount of arsenious acid about equal to  $\frac{3}{1000}$  of their own weight, a quantity quite sufficient to protect them from destruction by larvæ.

According to M. Leprieur, the employment of an alcoholic solution of arsenious acid possesses the advantage of preventing, in an almost absolute manner, the ravages of larvæ, whilst all other means, whatever be their efficiency, can have no other result than the actual destruction of the larvæ already present in a collection, without having any power to protect them from future ravages.—*Chem. News, London. from Journal de Pharm. et de Chim.* vol. xxxix.

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#### ON PHOSPHORESCENCE.

By M. DE REICHENBACH.

The experiments of M. De Reichenbach tend to prove that phosphorescence is a usual consequence of all molecular phenomena, and not the result of combustion or oxidation. Mr. Phipson proved this last point some time ago, when he showed that dead fishes shine in the dark, even under water, and in the absence of oxygen.

According to M. De Reichenbach there is phosphorescence during fermentation or putrefaction, crystallization, evaporation, condensation of vapors, the production of sound (vibrations therefore), and the fusion of ice; a considerable glow is remarked when a galvanic pile is in activity, a block of ice in fusion, or a solution of sulphate of soda in the act of crystallizing is observed in the dark.

The human body itself is not devoid of phosphorescence: in a healthy state it emits a yellow glow; when in ill-health the glow becomes red. The author considers that this observation may possibly be of use in diagnosis.

To perceive these phenomena the eye ought to have been previously rendered sensitive by remaining some hours in perfect

darkness, and even then all eyes are not equally impressionable. But, if several persons unite in performing the experiment together, there will always be a certain number who are able to see the phenomena.

These facts of the production of light remind the author of observations published some time ago by M. Wullner, according to which every molecular movement is accompanied by a disengagement of electricity.—*Chem. News, London, Nov. 23, 1861. from Poggendorff's Annalen.*

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### ON THE COPPER TEST FOR SUGAR.

BY JOHN HORSLEY.

A few weeks since the *Chemical News* contained a review of "Braithwaite's Retrospect," in which allusion was made to a new cupreous preparation, by Dr. Pavy, for the detection and estimation of sugar, which he recommended as being superior to either Barreswill's or Fehling's. In that respect I differ with him, having tried his method, and object to it on account of the excess of caustic potash it contains, having known instances where the copper was reduced *per se* on standing.

Like the Doctor, I have been so dissatisfied with the reduction by copper solutions as to direct my attention to other agents, till I found out that it was not so much the test itself as the mode of manipulation that required improvement, the copper test being delicate enough when well prepared, and the saccharine fluid sufficiently pure. The ordinary method of procedure is, I believe, pretty much as described by Dr. Pavy,—viz., to boil and decolorise the cupreous liquor by the addition from time to time of the saccharine solution; it being generally supposed that the powers of the sugar are defunct at the moment the blue color disappears, than which nothing is more fallacious, the sugar then being in excess, as may be proved by a further addition of the test and re-boiling. In fact, you may even make such an addition of the test as that, on boiling and filtering, the liquor shall pass through highly colored, and yet contain sugar, which will not cease to reduce copper till after two or three other boilings and filtrations have been made. The filtered liquid being permanently blue or blueish-green, and yielding no fur-

ther red precipitate after several minutes' boiling, is the alone criterion of the exhaustion of the sugar, which is just the inverse of the present method. The filtered blue liquid may be again rendered available for other reductions by concentration or evaporation down to about the tone of the original copper solution used. The following is the formula by which I make the solution of copper:—Sulphate of copper, half-a drachm; distilled water, three ounces. Dissolve by heat, then add, tartaric acid, half-a drachm; and, when cool, caustic potash, one and a-half drachms; and, lastly, pure carbonate of potash, one and a-half drachms. An ounce of this liquor boiled with half-a-grain of grape sugar, dissolved in a little water, gave a scarlet red precipitate of one and a-half grains, every three parts representing one of sugar. The  $\frac{1}{320}$ th part of a grain of sugar produces a decided precipitate. Diabetic urine ought to be purified by precipitation with excess of sugar of lead, and any remaining lead thrown out by passing a stream of sulphide of hydrogen, the liquid filtered and evaporated to about half its bulk previous to applying the cupreous liquor; but if the quantity of lead salt be nicely adjusted, there will be no necessity for using the gas. High-colored urine, supposed to contain sugar, requires, in addition to the precipitation by lead, to be decolorised by animal charcoal, and before using the test any lime which may have been acquired from the charcoal should be extracted by boiling the filtrate with a little carbonate of potash and filtering. Such urine will not afford, like true diabetic urine, a red precipitate, but a muddy, yellow one, if sugar exists at all, and the filtered liquid, instead of being blue, will be yellowish green.

Although it has been stated, on the authority of Brucke and others, that sugar obtains in ordinary or healthy urine, I have not been able to verify it by tests, owing probably to not having operated on a sufficiently large quantity. The only way of proving it, I presume, would be by carefully evaporating to an extract the purified urine and adopting the fermentation process. —*Chem. News, London, Nov. 30, 1861.*

## ON THE PREPARATION OF EXTRACTS.

BY MR. THOMAS B. GROVES.

I am inclined to believe that some at least of the views expressed by our President in a paper before the meeting of November 6, 1861, will, notwithstanding the high authority of their author, be received by Pharmacutists generally with diffidence, if not entire discredit.

For one, I am not disposed to admit that wholesale druggists, either invariably, or, as a general rule, employ the process "which gives the best result in the most direct manner," unless indeed by the "best result" is to be understood the best in a commercial sense.

Nevertheless their experience is doubtless of great value to us on many points, though the preparation of "Eclectic" medicines may not be one of them.

I am not a large manufacturer, but a very small one, and my experience is limited to a few plants that grow in my neighborhood, being too far from Covent Garden to avail myself of its treasures, without risk of their loss or deterioration.

The plant I have more especially worked is the *Hyoscyamus niger*, which is most years obtainable in considerable quantity and great perfection from the rocky soils in the vicinity of the sea, or from the the sea-cliffs themselves. I have it gathered when in full flower, and so soon as possible after strip the leaves and tender summits of the stalks from it, bruise them in a marble mortar, adding a little water should the mass not be sufficiently pulpy, express and evaporate by steam bath, without further treatment of any kind. The extract of Henbane, so prepared, I have never observed show a symptom of mouldiness, and have frequently kept it without extra precaution for two or three years, though the extract of *Conium* made in the same manner keeps badly.

Its narcotic smell and bitter taste are very striking; indeed so much do I prefer it to any I can buy, that I always make as much as I can, to be on the safe side in case of an accidental dearth of the plant.

I have always attributed the comparative inferiority of the purchased extracts to two causes: first, the use of the whole

plant instead of the leaf only ; second, the plant being cultivated instead of wild.

The first cause was not assigned without consideration aided by experiment.

I judged that the juices of a young herbaceous plant were *not likely* to be similar in every part of it (thus differing from a gentleman who spoke on this subject at the meeting), but that the juice of the stem and branches would in all probability mainly consist of a watery solution of the inorganic food of the plant on its way to the leaves for elaboration and fixation, and of gummy, albuminous and other inert matters contained in the stem ; that as the plant grew older and commenced forming its seed, a portion of such elaborated food would proceed in that direction, and be found *in transitu* in the softer part of the stem above the leaves. In the case of plants which form fleshy roots, tubers, etc., the course of the sap would be also diverted downwards through the stem, in all cases carrying with it the active principles of the plant, where such active principles are found in the fruit, or root, or both. Only in those cases therefore where the active principles of the plant are eventually more or less completely collected in the root, should I be prepared to find the juice of the stem rival in activity that of the leaves.

*Hyoscyamus niger* is not one of those cases. I therefore made the experiment of treating in a precisely similar manner, equal portions, twenty ounces, of rejected stems, and of leaves and tops such as I always employ for extracts. I may here state probably I reject on an average two-fifths of the plant ; the individual proportions however are very wide of the average.

The stems yielded 5½ dr. of a pale green extract, very saline in taste and less bitter and odorous than the 9½ dr. of dark extract I obtained from the leaves. The pale green extract was so evidently inferior that the physiological test was not resorted to.

The mixture of the poor and saline extract of the stem with the rich and characteristic extract of the leaves, in my opinion accounted for much of the inferiority of purchased specimens. I therefore put by specimens of both extracts and of their mixture, for the purpose of illustrating a paper I intended sending to the Society ; but, having first prudently consulted the old Jour-

nals, to see whether the same results had been announced before, I there found, in the first volume, a paper by Mr. Squire, which completely took from me all claims to originality, so I desisted from my intention.

The views there expressed are so diametrically opposed to those of the more recent contribution, that I wonder reference was not made by the author of both, or by the meeting, to the fact. I quote the following from page 97, Vol. I. 'Pharmaceutical Journal';—"The different parts of the plants which should be selected, is a subject of great importance. The College directs the leaves of those which are principally adverted to, and I think very properly. I have placed on the table for comparison, juice from the stalks of *Hyoscyamus* and juice from the leaves of *Hyoscyamus*, also two portions of extract resulting from equal bulks of juice; the one from the stalks, the other from the leaves. The sensible properties of these preparations will enable the Society to distinguish their wide difference."

The question, it must be remembered, is not merely which process yields the better, but also *which the stronger*, extract; and whilst I am quite willing to admit that the gummy and saline extract of the stem would greatly aid the keeping qualities of the extract of the leaves, I must dissent from the opinion that it is stronger, until more conclusive experiments have made the point certain, and indicated in each case the limit within which the use of the stem must be confined. To improve their consistence, and thereby aid their keeping, the addition of gum is recommended by Gray, and I have long suspected the use of salt for the same purpose by modern manufacturers. The single experiment on which is founded a change of opinion as to the relative strength of the two extracts, must in candor be admitted to be a highly inconclusive one. But one species of plant was tested, and that gathered at an exceptional time, and in a most unusual condition, as is evidenced by its enormous yield of extract; fully three times the ordinary yield.

Again, knowing the extreme sensibility of the eye to the action of Belladonna, we should hesitate to receive any statement as to relative strength of specimens by means of that organ, before knowing the exact mode in which the results were obtained. The best plan appears to me to be this:—gradually dilute

each specimen until it ceases to have any dilating effect, and then see which has borne dilution best.

Finally, the new view runs counter to very old opinions expressed and acted on by writers and the general public in all ages, that the dark livid-green of certain plants points to their poisonous properties; an opinion expressed by Pereira, who refers to the "dark lurid aspect of the Belladonna plant, as indicative of its deadly narcotic quality."—*London Pharm. Jour.* Jan. 1862.

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### ON SOME VARIETIES OF TANNIN.

By JOHN STENHOUSE, LL.D., F. R. S., F. C. S.

In two communications "On some Astringent Substances as sources of Pyrogallic Acid," read before the London Chemical Society in the years 1842, 1843, I showed that the usual division of the varieties of tannin into two genera—to wit, those which give black, and those which give green precipitates with salts of iron—though called in question by Berzelius, is still well founded: and likewise, that these two genera consist of a great variety of species, which, though closely resembling each other in properties, are still dissimilar in nature; the only instance in which the same species of tannin had been procured from two different plants, being those of nut-galls and sumach. Professor Strecker's important observation made some seven years ago, that grape-sugar is produced when the tannin of nut-galls is boiled with dilute sulphuric acid, seemed to render a further examination of the varieties of tannin desirable.

#### *Sumach.*

As the tannin of sumach cannot be obtained in such a high state of purity as that of nut-galls by Pelouze's ether process, I was obliged to employ other methods by no means so satisfactory, but which still yield a tolerably pure tannin. A strong decoction of sumach was therefore treated with acetate of lead, which threw down a pale yellow precipitate. This was washed by decantation, and then decomposed by sulphuretted hydrogen and filtered; the filtrate having been boiled with dilute sulphuric acid, on standing for some time, deposited crystals of impure gallic acid. These were collected on a filter, and the mother-liquor,



when neutralized with chalk, gave abundant indications of sugar, both by Trommer's test and when subjected to fermentation. A second decoction of sumach, when cold, was treated with sulphuric acid, which threw down a copious precipitate; this, when boiled, was also resolved into gallic acid and grape-sugar. This reaction, therefore, in addition to former experiments, serves to confirm the identity of tannin in oak-galls and sumach.

When sumach is long kept, the tannin it contains appears to be resolved, in a great measure, into gallic acid and grape-sugar, owing to its undergoing a species of natural fermentation. Accordingly, under these circumstances, when simply boiled with water, sumach emits an odor resembling that of tea, and yields a large quantity of sugar and gallic acid, but mixed with much impurity. Sumach, therefore, though it contains much gallic acid, owing to the impurities present in it, is not a good source of that acid.

I may also remark, that the amount of tannin in sumach varies considerably, some specimens being very rich and others very poor. This probably arises from the circumstance that the sumach of commerce is the product of various kinds of *Rhus*, such as *Rhus cotinus*, *Rhus coriaria*, &c.

#### *Chinese Galls.*

These singularly-shaped galls, which are angular and slightly translucent, have been imported into this country in small quantities for the last fourteen or fifteen years. They are said to be found on the branches of a plant which grows in Japan. From the small amount of the coloring matter they contain, Chinese galls are greatly preferred for the manufacture of gallic acid. Oak-galls, on the other hand, are the best source of pyrogallic acid. The decoction of Chinese galls gave a copious white precipitate with acetate of lead. This was decomposed by sulphuretted hydrogen, and filtered; the clear liquid, when boiled with sulphuric acid, was resolved into gallic acid and grape-sugar, as in the two preceding instances. Another portion of the filtered liquid was evaporated to dryness, and destructively distilled. It yielded a very large quantity of pyrogallic acid. It is clear, therefore, that gall nuts, Chinese galls, and the various kinds of sumach, contain the same species of tannin.

*The Tannin in Tea.*

The tannin both of green and black tea is invariably accompanied by a small quantity of gallic acid, which does not arise from the decomposition of the tannin in the tea, as is the case with nut-galls, sumach, or Chinese galls. On treating a strong decoction of tea, when cold, with nearly half its bulk of sulphuric acid, the tannin falls as a dark brown precipitate. This was collected on a cloth filter, strongly compressed, and washed with a little cold water to free it as much as possible from adhering impurities. The precipitated tannin, when boiled with dilute sulphuric acid, did not yield a trace either of grape-sugar or gallic acid, but was changed into a dark brown substance nearly insoluble in water. It dissolved pretty readily in alcohol, forming a dark brown solution, from which, however, no crystals could be obtained.

*Oak-bark from Quercus pedunculata.*

A decoction of oak-bark gave a dark brown precipitate with acetate of lead. This was decomposed by sulphuretted hydrogen. The filtered solution, when boiled with sulphuric acid, yielded grape-sugar and a reddish brown precipitate, but no gallic acid. The reddish brown precipitate dissolved with difficulty in spirit of wine, but gave no crystals on standing. Rochleder has stated that tea and oak-bark contain the same species of tannin. They certainly resemble each other in their general characters; but as the tannin of oak-bark yields sugar when boiled with dilute sulphuric acid, while that of tea does not yield a trace of sugar, it is clear that the two tannins are not identical.

*Valonia, the acorn of the Quercus Ægilops.*

This species of tannin, which has a bright yellow color, when treated in the way already described, yielded sugar, but no gallic acid.

The tannin of pomegranate rind also gave abundant indications of sugar, but no gallic acid.

The tannin of Myrobalans, the fruit of *Terminalia Chebula*, gave similar results.

*Tannins which give green precipitates with persalts of Iron.*

*Salix triandra* and *Salix undulata* (the willows generally used for basket making).—A quantity of the bark of these two wil-

lows, when boiled with water, yielded a dark brown solution. This, when treated with acetate of lead, gave a copious precipitate of a brownish-yellow color. This lead-salt was decomposed by sulphuretted hydrogen; and the clear filtered liquid, when boiled with sulphuric acid and then neutralized with chalk, gave abundant indications of grape-sugar. Another portion of the solution from the decomposed lead-precipitate, when digested with nitric acid, yielded only oxalic acid.

When a decoction of willow-bark is boiled with dilute sulphuric acid, the brown colored liquid becomes very red, and a flocculent brownish-red precipitate falls, which is nearly insoluble in water, but dissolves pretty readily in hot spirit of wine and alkaline leys. The brownish red precipitate, when dissolved in spirit of wine and left to spontaneous evaporation, did not crystallize, but formed a dark brownish resin. It consisted chiefly of impure saliretine, resulting most probably from the decomposition of salicine in solution. When it was digested with nitric acid, it yielded a good deal of nitropicric acid. Willow-bark, therefore, is a tolerably good source of this acid.

*Alder-bark* (*Alnus glutinosa*).—Alder bark yields a dark red decoction with water. It was precipitated with acetate of lead, and the lead-salt decomposed with sulphuretted hydrogen. It formed a dark red solution, which on digestion with sulphuric acid yielded no sugar.

*Catechu*.—It was the light-colored cubical variety of catechu that I employed. The tannin from this astringent substance, when digested with dilute sulphuric acid, yielded no sugar, a result which corresponds with Neubauer's experiments (*Ann. der Chem. und Pharm.*, vol. xcv., p. 103.)

*Larch-bark* (*Pinus larix*, *Linn.*).—The bark of the larch is employed in Scotland to some extent in tanning, though the leather made with it is inferior in quality. Larch-bark contains a good deal of a peculiar tannin, which yields olive-green precipitates with salts of iron. The aqueous solution of larch-bark is strongly acid to test paper, and has at first a pale yellow color, which exposure to the air renders brownish-red. Acetate of lead threw down a copious yellow precipitate; this was decomposed by sulphuretted hydrogen and boiled with dilute sulphuric acid, when the liquid assumed a fine scarlet color, like infusion of Brazil-

wood. The altered tannin precipitated on cooling in beautiful red flocks, as it is but little soluble in cold water. It is very soluble in alcohol, and its solution has a rich scarlet color, which is characteristic of this species of tannin. Its alcoholic solution, when left to spontaneous evaporation, did not yield crystals, but formed a dark resinous mass. The clear liquid from which the red flocks were precipitated, when neutralized with chalk, gave no indications of sugar. Sugar, however, together with a good deal of mucilage and resinous matter, with some larixinic acid, is contained in the crude decoction of larch-bark.

*Bark of the common black Mangrove* (*Rhizophora Mangle* of botanists).—This species of mangrove-bark is used in tanning, and is occasionally imported into Great Britain for this purpose. It has a brownish-red color: the color of its decoction is the same. The tannin it contains is precipitated from its solution both by acetate of lead and concentrated sulphuric acid. When boiled with dilute sulphuric acid no sugar is produced, and the brownish-red precipitate which falls cannot be made to crystallize.

In conclusion, I would observe that it is somewhat remarkable that so many of the tannins which give bluish-black precipitates with persalts of iron are glucosides; whereas of those which give olive-green precipitates with persalts of iron, so far as I know, only one—to wit, the tannin of the willow—is a glucoside.—*Lond. Pharm. Jour.*, Dec. 1861, from *Proc. Royal. Soc.*

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#### ON THE ACIDS AND RESIN OF BENZOIN.

Since Messrs. Kolbe & Lauteman's paper on the acids of benzoïn (see page 220, vol. ix. *Am. Jour. Ph.*) announcing the presence in the benzoïn of Sumatra, of toluyllic acid, these chemists by new researches have satisfied themselves that the acid in question is not that acid, but a compound of two parts of benzoic and one part of cinnamic acid.

It is easy to be assured of the presence of this last acid by boiling the benzoïn with milk of lime, filter, precipitate by chlorohydric acid, and add permanganate of potassa. If cinnamic acid is present, an odour of oil of bitter almonds is produced, resulting from the reduction of that acid.

These two acids are always met with in the same proportions

in the different varieties of resin of benzoin. It is this fact that has led the authors to believe that they have found it in a state different from simple mixture.\* The combination is never intimate because it can be undone not only by fractional precipitation, but by simple crystallization.

Finally, the fusing point of this acid is  $26^{\circ}$  C. below that of benzoic acid ( $120^{\circ}$  C.), and M. Aschoff has found that a little cinnamic acid will modify greatly the fusing force of the benzoic.

The complete separation of these acids has been effected by way of fractional precipitation, by means of nitrate of silver acting on the ammoniacal salt.

M. Aschoff has since found cinnamic acid exclusively present in the almonds-like tears of a benzoin of Sumatra, which had a strong odor of storax. These almonds were in greater part soluble in ether, the solution contained cinnamic acid 11 per cent; resin soluble in alcohol 78 per cent; foreign matter 4.5 per cent. At the most there was but 5.4 per cent of resin insoluble in ether and soluble in alcohol.—*Annal. der Chem. and Journ. de Pharm. Nov.*, 1861.

## ON THE ADULTERATION OF TIN FOIL.

By MR. J. H. BALDOCK.

Having occasion a short time back to prepare some compounds of tin, I employed for the purpose, in the absence of granulated metal, some tin foil, and was surprised to find my product very largely contaminated with some other metal. Upon careful examination of the tin foil which I had used, I found it

\* (Note by M. J. Nickles.)—Benzoic and cinnamic acids belong to the same homologous series of aromatic acids; in view of their composition they are related as the acetic and butyric acids.

Acetic acid	$C_4 H_4 O_4$
Butyric	$C_8 H_8 O_4$
Benzoic	$C_{14} H_6 O_4$
Cinnamic	$C_{18} H_8 O_4$

As has been shown in this Journal (*Jour. de Pharm.* xxxiii. p. 351) how the two first can combine to form butyro-acetic acid,  $C_6 H_8 O_4$ , so benzo-cinnamic acid of MM. Kolbe & Lauteman is a combination of the same kind, and not more stable than the first.

to contain a large amount of lead. Believing that the presence of this metal in such considerable quantity in the foil is not generally known and recognized, I obtained a number of specimens of commercial foil and submitted them to analysis. Some of these were kindly supplied to me by Mr. Haselden, of Conduit Street, the remainder being collected by myself. They consisted of—1. Ordinary commercial foil; 2. Embossed foil; 3. Tinned paper; and 4. Foil lining the packets of Horniman's tea; together with a sample of 'Pure Tin Foil' from Mr. Saddington's, and some of Betts' Patent Capsules. The following table of the results of the analysis in the several cases will show the proportion of lead and tin present in the different samples. The processes employed will be subsequently described.

	1	2	3	Pure Foil	Betts' Capsules.
Lead	86.93	76.57	88.665	84.375	84.56
Tin	13.06	23.42	11.345	65.625	15.46
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	99.99	99.99	100.000	100.000	100.02

It thus appears that tin foil is such only in name, though the reason of this large admixture of lead is not very apparent, because the so-called pure foil noticed above, which contains a much smaller proportion of lead, appears to be in every respect better suited to general requirements, being at once thinner, lighter, and tougher. The only cause that I can assign is, that the alloy may be more easily rolled than the pure metal. I may remark that the sp. gr. of the alloy is less than would be indicated by calculation from the sp. gr. of the two metals. In Gmelin's Work a table is given, showing the actual and calculated and specific gravities of these two metals when alloyed in different proportions.

Not long since there was a great deal said respecting the packing of tea, tobacco, snuff, etc., in lead foil, as in several instances accidents had occurred, owing, as it was then shown, to the formation of a subcarbonate of lead, which was disseminated through the contents of the packet; and, if I recollect rightly, it was suggested that tin foil should be substituted for that made from lead. If it is true, however, that tin foil is itself so extensively adulterated with lead, it is obvious that no advantage

would be gained. On the contrary, such an alloy is more easily acted upon than either of its components would be alone. Some time back I noticed on some foil, which had been in contact for some time with a packet of acid paper for Seidlitz powders, evidence of corrosion or chemical action, and the presence of lead was shown by the resulting compound blackening in the presence of HS.

For simply detecting the presence of the lead, I found the readiest method to consist in oxidizing the foil with nitric acid, and to dissolve out the nitrate of lead from the insoluble peroxide of tin with hot water. Crystals of the salt were generally deposited from the solution on standing. For the quantitative estimation of the two metals, I have tried several processes, with varied degrees of success.

First, dry chlorine gas was passed over the foil, heated in a bulb tube, when the volatile bichloride of tin distilled over, leaving the fixed chloride of lead in the bulb. This process was not, however, adopted, for two reasons: 1st, because some difficulty was experienced in condensing the whole of the distillate; 2dly, and most important, that some of the foil at the termination of the process fused and escaped the action of the gas.

Secondly, the foil was treated with nitric acid, sp. gr. 1.37, whereby the tin became converted into the insoluble binoxide, and the lead into nitrate; the latter was dissolved out by water, the lead precipitated as sulphate, which was washed, dried, and calcined, and from which was calculated the amount of the metallic lead; the binoxide of tin was also washed, dried, and calcined, and the amount of metallic tin calculated from it; this process is simple, expeditious, and appears to give very good results.

Thirdly, the foil was treated with nitric acid, and evaporated nearly to dryness, with a small excess of sulphuric acid, whereby the two metals were converted into sulphates; the nearly dry residue was then washed with water, and digested repeatedly with solution of acetate of ammonia of sp. gr. 1.06 or above, which dissolved out the whole of the sulphate of lead. Sulphide of ammonium was added to the solution, and the precipitated sulphide of lead washed, and reconverted into sulphate by heating with a mixture of nitric and sulphuric acids, and from this.

the metallic lead was calculated as before: the sulphate of tin was then calcined to convert it into binoxide, from which the metallic tin was calculated. There appears to be no objection to this process, except that it is rather long, as it gives very good and accurate results; it has, moreover, the merit of simplicity. The annexed table gives at A the results of the second process upon sample No. 1; and at B the results of the third process upon the same sample:—

	A.		B.
Lead	85.52	Lead	84.84
Tin	14.12	Tin	15.06
	<hr/>		<hr/>
	99.64		99.90

Both these, it will be observed, estimate the lead a little too low, arising from insufficiency of washing, some time being required to complete that part of the process.

The process, however, which I found to give me by far the best results, and to be the most convenient in execution, is one described by Rosé. It consists in fusing the alloy with an excess of a mixture of sulphur and carbonate of soda. The metals combine with the sulphur to form sulphides, while at the same time the sulphur and carbonate of soda react to form sulphide of sodium. The sulphide of tin combines with the alkaline sulphide, forming a soluble compound, while the sulphide of lead remains unaffected. The fused mass is digested with water, and filtered. The insoluble sulphide of lead is washed, dried, and calcined with a mixture of nitric and sulphuric acids, whereby it is converted into sulphate, from which the lead is calculated as in the previous cases; to the filtrate excess of hydrochloric acid is added, which decomposes the sulphur compounds, and precipitates sulphur and the sulphide of tin; the precipitate is washed, dried, treated with nitric acid, and calcined, when binoxide of tin results, from which the metal is calculated.—*Lon. Pharm. Jour. Jan. 1862.*

#### ACTION OF WATER ON COMMERCIAL CHLORIDE OF LIME, AND REMARKS ON ITS CHEMICAL CONSTITUTION.

By M. FRESSENIUS.

It is generally admitted that chloride of lime is composed of a mixture of hypochlorite of lime, chloride of calcium, and hy-



hydrate of lime; or a combination of hypochlorite of lime with chloride of calcium, mixed with hydrate of lime. M. Millon, on the contrary, considers it to have the composition  $\text{CaO}, \text{Cl}$ . The author thought that the action of water on chloride of lime would throw some light on its constitution.

The chloride of lime employed for analysis was taken from a large sample of 250 kilogrammes. It yielded 26.52 p. c. of chlorine, and 13.25 p.c. of hypochlorous acid. To estimate the whole of the chlorine a weighed quantity was treated with water and ammonia, nitric acid added, and the solution then neutralized by carbonate of soda. The chlorides were then estimated in the liquid by nitrate of silver. By the volumetric process with bichromate of potash, 29.57 p. c. of chlorine was found.

The lime was precipitated by oxalate of ammonia. Two analyses yielded 46.85 p. c. and 46.40 p. c. Mean = 46.37 p. c. From these numbers the following composition is calculated:—

$\text{CaO}, \text{ClO}$	. . . . .	26.72
$\text{CaCl}$	. . . . .	25.51
$\text{CaO}$	. . . . .	23.05
Water	. . . . .	24.72
		<hr/>
		100.00

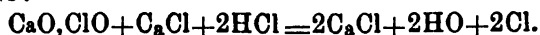
Which may be thus stated:—

$\text{CaO}, \text{ClO}$	. . . . .	26.72
$\text{CaCl}$ (in combination with the above as $\text{CaO}, \text{ClO} + \text{CaCl}$ )	. . . . .	20.72
$\text{CaCl}$ in excess	. . . . .	4.79
$\text{CaO}, \text{HO}$	. . . . .	30.46
Water combined	. . . . .	17.31
		<hr/>
		100.00

The author has verified this composition in the following manner:—

A weighed portion of chloride of lime was treated with a known volume of hydrochloric acid. The reaction was conducted in a flask furnished with a long glass tube to avoid loss of the acid. The difference in strength of the hydrochloric acid before and after the experiment showed the quantity of acid saturated by the lime. This was found to be equivalent to 57.206 of anhydrous acid for 100 of the chloride. This closely

approximates the amount required by theory. The reaction is as follows:—



26.72 of hypochlorite and 20.72 of chloride of calcium being present in 100 parts of chloride of lime, there would be then 47.44 p. c. of chloride of lime, requiring 27.24 of hydrochloric acid, the 30.46 of hydrate of lime requiring also 30.01 of acid, making 57.25 together. Experiment gave 57.206.

The lime of the 4.79 of chloride of calcium, not having been saturated by the acid, would remain in excess.

50 grammes of chloride of lime were treated with ten successive gradually increasing portions of water. 80 grammes of water were employed for the first lixiviation; the mass being thrown on a filter, 20 grammes of filtrate were obtained; a second lixiviation yielded 30 grammes of solution; a third, 100; a fourth 120, etc. The results are shown in the table below.

These solutions were analyzed immediately after filtration to avoid as much as possible the action of the air. The chlorine and hypochlorous acid were estimated as before; the same estimations were also made in the deposit remaining after the tenth washing. The following numbers were obtained:—

Solution.	CaO, ClO	CaCl.	Atoms of CaCl for 1 atom of CaO, ClO.
1 . . .	4.5371	15.9437	4.5279
2 . . .	5.2254	7.6451	1.8851
3 . . .	3.6968	2.6064	0.9084
4 . . .	1.6004	0.9897	0.7968
5 . . .	0.4672	0.2971	0.8193
6 . . .	0.1600	0.1198	0.9647
7 . . .	0.0602	0.0487	1.0422
8 . . .	0.0128	.	.
9 . . .	0.0060	0.0067	1.4319
10 . . .	0.0039	0.0043	1.4521
Residue . . .	0.1389	0.0321	0.2981

The following conclusions are drawn from these experiments:

1st. The first portion of water (80 grammes) dissolved all the chloride of calcium, as the last portions contained very little.

2d. The hypochlorite of lime, on the contrary, entered gradually into solution.

3d. At the end of the third lixiviation all the free chloride of calcium was dissolved; for from this time the proportion between the hypochlorite of lime and the chloride of calcium became nearly regular.

4th. As the chloride of calcium dissolves at once completely, while the hypochlorite dissolves principally after the third lixiviation, it results that either these two bodies are in combination, or that the water decomposes chloride of lime into hypochlorite and chloride of calcium.

5th. The author considers that the hydrate of lime is combined with the chloride of calcium, forming a basic chloride. This would explain the reason why 4 atoms of hydrate of lime take 2 atoms only of chloride. This opinion is supported by the fact that the crystalline compound  $3\text{CaO}, \text{CaCl} + 16\text{HO}$  is decomposed by water into hydrate of lime and chloride of calcium.

6th. The author assigns to chloride of lime the following formula:—



7th. The hydrate of lime separated when the chloride of lime is treated with water, retains with great force a certain amount of hypochlorite which repeated washings will not remove. In estimating exactly the hypochlorous acid in chloride of lime, it is necessary, therefore, to value the deposit with the solution. For commercial purposes, however, it is better to assay the clear solution filtered from the deposit, as that alone is employed, the deposit being usually rejected.—*Lon. Pharm. Journ. Jan. 1862, from Répertoire de Chimie.*

#### ON THE PRODUCTION OF NITRATE OF SODA AT IQUIQUE (PERU.)

As Iquique is the centre of this trade, and to it its present importance is wholly to be attributed, it is thought to be advisable to convey in this report as much information as can be procured as to this article, and in order that such information shall be truthful, the writer has availed himself of the views of several Englishmen at present engaged in the trade.

About from six to fourteen leagues from the coast, and run-

ning parallel with it through the province, at an elevation of 3300 feet, or there about, is the Pampa of Taramugal. This plain or pampa was a sea lake, and the greater part is covered with salt along the western border; and generally not extending eastwards more than 500 yards to the verge of the old lake is found the "caleche" or "terra salitrosa," rough nitrate. Between the pampa and the coast exist other old sea lakes, on the borders of which "caleche" is also found; but these deposits are of secondary import. The "caleche" is generally found in insulated masses, irregular in shape and thickness, which adds greatly to the expense of working. It is sometimes found with only a few inches of sand over it, but more frequently covered with a hard stone, consisting of sand indurated with salt; this is called "costra," the thickness of which varies from one to ten feet, but averages three feet. The "caleche" varies in thickness from one to nine feet, but in general runs from three to four feet; below this exists a soft sand, containing an abundance of crystals of glauberite and small quantities of borates of lime and soda. The strata consists of—

1. Loose sand, a few inches thick.
2. Hard sand, indurated with salt, from one to ten feet thick.
3. "Caleche," from one to nine feet thick.
4. Soft sand or cora.

The "caleche" varies in quality from nearly pure salt to 50 and 60 per cent. of nitrate, generally containing the following substances: Earthy matter, Nitrate of Soda, Chloride of Sodium Sulphate of Soda, Sulphate of Lime, and traces of Chloride of Magnesium, and Iodides and Bromides.

It is impossible to state the respective proportions, as they vary with every different sample. The method of extracting and refining nitrate of soda is as follows:—

When "caleche" is required, the barretero (miner) makes holes in the ground where he expects to find it. If successful, he fills up the holes with coarse gunpowder made on the spot (costing three and a-half dollars per quintal), regulating the charge in proportion to the thickness and hardness of the "costra" and the thickness of the "caleche;" the charge varies from one to eight quintals, and occasionally as much as fourteen quintals; when blasted the whole mass is turned over and mixed.

He then proceeds to separate the "costra" and "cora" from the "caleche," throwing aside all the latter that he does not believe to contain more than ten or twelve per cent. of nitrate; it is then broken into smaller lumps, to be conveyed to the "paradas." A refinery of nitrate is called an "Oficina," and is generally placed in the centre of the calecheros or nitrate grounds, and consists of one or more paradas; a parada is a pair of round iron boilers, each holding from 70 to 300 gallons; these are placed together, in rough stonework, with a fire-place between them. At the parada, the acendrador breaks the lumps into pieces about the size of a fist, and rejects the inferior pieces, so as to bring the whole to about 25 to 34 per cent. of nitrate. It is now thrown into the boilers with a quantity of water; after boiling some two or three hours, the fondeador (boiler) continually stirring the mass, supposing that the caleche is by that time exhausted, throws out the ripio (refuse,) adds more caleche and mother water; and, after boiling some two or three hours, a well saturated solution is obtained; it is then by hand baled into a deposit, from whence, as soon as the mud and salts are deposited, it is baled into shallow coolers, where it crystallizes. The mother water is then drawn off, and the nitrate thrown out to dry. The paradas are charged twice a-day, and the daily product is from fifteen to twenty quintals of nitrate, containing about 3 per cent. of impurities, chiefly common salt. The average cost of a quintal of nitrate is:—

Barretero, breaking out . . . . .	12½ cents.
Acendrador, assorting . . . . .	6¼ "
Fondeador, boiling . . . . .	12½ "
Powder for blasting . . . . .	6¼ "
Asses bringing the caleche to the paradas . . . . .	3 "
20 lbs. coals at \$1.50 per quintal . . . . .	30 "
Wear and tear of parada, reparations, and depreciations . . . . .	29½ "
	<hr/>
	\$1.00

This system of making nitrate is the same as was first adopted at the commencement of the trade, and unquestionably well adapted for that early period, having the advantage of being simple, easily understood and worked; yet it is still continued

and the whole system of labor arranged to it. It is almost impossible to conceive a system more rude and more wasteful; and although many exertions have been made during the past ten years, without success, to improve it, yet that want of success has been caused chiefly by the lack of skilled labor in the province; still there is no doubt that it will be superseded, in the course of a few years, by the more refined and complicated apparatus now being introduced. The theory of the process of refining nitrate is this:—"Caleche" consists of nitrate of soda, chloride of sodium (common salt), and earthy matter, (the other substances present exist in such small quantities that they are overlooked); and as chloride of sodium is very little more soluble in boiling than in cold water, whilst nitrate of soda is comparatively insoluble in cold, but very soluble in hot water, it is very evident that it is only required to add such quantities of "caleche" to boiling water to procure a strongly saturated solution; the earthy matter, being insoluble, is left with the excess of common salt in the boiler, or the deposit, before it is discharged into the coolers, where, as the liquid cools, it deposits the excess of nitrate of soda, the mother liquor retaining all the salts in solution. Reverting to the customary process of refining, two systems are now being tried, which use steam; in the one (Gamboni's patent) the "caleche" is placed in an inverted semi-cone, with a perforated cover and bottom; through the side a jet of steam is introduced, mother water is thrown on the cover, and the refined nitrate falls through the bottom, and is at once conveyed to the coolers; in the other, steam is introduced to boil the solution; but both promise the same advantages—economy in the make, and a superior article.

No sketch of the nitrate trade would be complete without some reference to the abuses. In the first place, it is badly based. The merchant makes advances to the soliteros, officineros (makers), of money and goods, on the promise of receiving in return the product of the officina. This advance frequently is used in paying off old debts, or in advances to the laborers. The merchant must still keep advancing barley for the troops, coals and provisions for the laborer, &c., or there will be no nitrate forthcoming. This system trenches heavily upon the merchant's resources, and occasionally leads to losses.

The officineros, as a body (with some exceptions,) are a reckless set of men, wasteful in their expenditure and careless of their promises. Their arrangements with their laborers are also bad; their principal ones, the barretero, acendrador, and fondeador, being paid according to the product of the parada, recriminations are ever recurring, and not unfrequently leading to a closing of the works. Another thing must also be noticed—the great amount of adulteration that has taken place within the three past years. Rarely a cargo leaves that is better than 5 per cent., some even 7 to 10, and some samples assayed have shown as much as 30 to 50 per cent. of foreign matter. The adulteration is effected in two ways; in one, white “caleche” is ground and mixed with the refined nitrate,—this is called green nitrate: the other, the powdered “caleche,” is mixed into the solution, and at once put into the coolers,—this is dirty nitrate. This is in some measure protected by the present state of the trade. Merchants in England purchase from the importer, and get a deduction from him corresponding to the amount of foreign matter in the article; but as the general sales are made without any deduction, then the worst cargoes are the most profitable to the merchants.

The province has not been thoroughly surveyed; but enough “caleche” has been discovered to yield an increased supply for ages. In May, 1856, there were about 100 oficinas at work, with about 250 paradas; but the work is not constant, 240 days is a good year's work. The principal sales of this article are made in Valparaiso, on the usual terms, viz., ore well sacked, not to contain less than 95 per cent. of nitrate placed in the ship's launch outside the surf. The price has been very fluctuating, commencing at 18 reals, rising to 20 reals, falling to 16 reals, and then in four months rising to 23 reals, but taking an average price of 19 reals, 936,719 quintals, with the exchange at 46 dollars, would give 426,402*l.* 5*s.* 10*d.* The other salts found in the province are chloride of sodium, biborates of lime and soda, sulphates of lime and soda, magnesian alum, &c. Iodine exists with the nitrate, and throughout the calecheros traces of boracic acid have been found in the water.—*Chem. News, London, Jan. 18, 1862, from the Report of H. B. M. Consul.*

## ON THE INFLUENCE OF CULTIVATION UPON MEDICINAL PLANTS.

Some correspondents have recently expressed to us their belief, that extracts made from herbs growing wild keep better than those prepared from the same plants in a cultivated condition. As this is a point of great interest, and one which has an important bearing upon the preparation of medicinal extracts, we subjoin the following translation from *L'Union Pharmaceutique*, of a Report recently presented to the Imperial Society of Medicine of Toulouse, *On the influence of cultivation upon Medicinal Plants*, by M. Timbal-Lagrave.

“At the present time, it is scarcely necessary to insist upon the advantages to be derived from a knowledge of botany, and the important applications of such knowledge in the treatment of disease. Whilst we thus admit the importance of an acquaintance with the medicinal properties of plants, we must acknowledge, however, that it is not so easy to ascertain with certainty under what condition medicinal plants should be chosen and collected. Although many authors have written treatises on Therapeutics and Pharmacology, we are far from knowing, as yet, the principles which ought to be acted upon in the choice and collection of medicinal plants. The greater number of writers recommend that such plants should be collected in those places where they grow wild, under the belief that if they are removed from their natural habitats, they will but rarely find in their new ones those conditions which are necessary for their complete development; and that, hence, they will languish, become sickly, and will not possess in the same degree the properties which they had in their natural states, and the medical practitioner would therefore have to deal with doubtful and variable agents, in which he could place no confidence.

“It must not be imagined that this decision in favor of wild plants has been arrived at hastily, or without proofs: on the contrary, it rests on certain scientific data, which the labors of modern physiologists have confirmed. Thus, if we cast an attentive glance upon the distribution of plants over the surface of the globe, we shall be struck at once with their number and variety; and if we search for the cause of such variety



and for the evident preference of certain plants for particular localities, we shall see that they obey those influences in which heat and light have the greatest share; it is in fact by them that the seasons affect the climates, which have, in their turn, so powerful an action upon vegetation. It is heat and light which increase or diminish the respiration, circulation, absorption, and exhalation of plants; in fact, it is to their influence that vegetable secretions owe their peculiar tastes and odors. A plant, says M. Alph. de Candolle, is a living machine working under the influence of two external agents, heat and light, and one internal, life. He observes, at the same time, that the old botanists ascribed to these two agents a still greater influence, for they looked upon plants as thermometers, the degrees of which were marked by the phenomena of vegetation.

"It is also by heat and light that we explain the preference of some plants for certain latitudes, certain climatic zones which they do not go beyond; it is also by them that we account for the presence of a great number of species at particular heights above the level of the sea, from whence they neither ascend nor descend without destroying themselves or their progeny. It is also to these two agents that we must attribute the fructification of certain species in a given spot, a fructification which cannot be produced if such plants be placed in colder regions; such are, for example, the olive, jujube, etc.

"To these and other causes of a purely physical character, we might add those of a chemical nature, for although these have been altogether denied by some writers, they have, nevertheless, a great influence upon the distribution of plants over the earth. All botanists, for instance, know the preference of certain species of plants for silica, chalk, etc.; of others, for mixed rocks and gravel, etc. Those species, again, which inhabit swampy or turfy ground; those which select stagnant and warm waters, or those which choose running and cold streams; and those which spring up in the woods, meadows, or upon walls, ruins, etc., are not placed in such situations by chance and without appreciable causes. Again, without referring to parasitic plants, examples of a more extraordinary predilection have been noticed,—such, for instance, as are presented to us by alternating plants—namely, those which appear in certain soils for one or two years,

then disappear to return again and again disappear; thus obeying some particular physical and chemical influences which are necessary for their development.

“The study of the physical and chemical causes which are concerned in the distribution of plants over the earth constitutes the science of Botanical Geography. It is upon the data furnished by this science and upon some very conclusive physiological experiments that the selection of medicinal plants should be based if we desire to obtain efficient remedies; such, at least, is the design of pharmacologists when they advise the employment of wild plants, for they think that when they are obtained growing under other conditions, that is, when in a state of cultivation, they have lost a great portion of their medicinal properties.

“It is unnecessary for us to refer here to the various modifications which the use of simples in medicine have undergone, or to the value of the more or less whimsical notions which led to the mixture of many obscure remedies with those of undoubted medicinal value. It is sufficient for us, at the present time, to show that a great number of plants do possess valuable medicinal properties, which render their use of great importance in the treatment of many diseases; and that, from their frequent and daily employment, a great increase in the commercial value of several of them has resulted. Hence has arisen the idea of submitting such plants to cultivation in the same way as is done on a large scale with those species which are employed for food or forage. Such attempts were at first made on a small scale, but in a short time horticultural establishments arose on all sides in which were cultivated all our indigenous plants employed in medicine, from the *digitalis*, *belladonna*, *aconite*, etc., to the mullein and common red poppy. These productions, more developed, more fattened, if I may so speak, by cultivation, sell, on account of their better appearance, etc., at much higher prices than the same obtained in a natural state.

“In these establishments all the plants are grown together without any previous investigation as to whether the soil be favorable or otherwise; whether the situation will injure the development of their active principles, or whether the height of position which these plants prefer will not result in modifying

their properties; nothing of all these matters is considered. Those persons who make such speculations are most frequently strangers to the pharmaceutical profession, do not suspect the importance of these questions, nor the great injury they cause thereby to the public health; they sell their productions as gardeners sell their vegetables; the profit they obtain largely repays them for their labors; they have attained their object; they care for little beyond, they are not responsible for the injury produced. Nor is this all, for, to increase the profit as much as possible, they subject some plants, such as peppermint, balm, belladonna, stramonium, to the same periodical cutting as is practised in the cultivation upon a large scale of forage plants in our fields, without considering in the least whether such a treatment, which does not give the plants time for elaborating their active principles, will not considerably impair their medical properties. We have known, since the time of Daubenton, that the young shoots of aconite and hemlock may be eaten with impunity, while the full-grown and mature plants of the same species are poisonous. We know also that many labiate plants, such as mint and balm, contain most bitter and volatile principles when in flower.

“Thus, the scientific edifice upon which *materia medica* rests is falling to decay; it is thus that the minute observations amassed during many ages of experience by learned men who have sacrificed their time and their labors to the relief of humanity, disappear.

“Taking the above facts into consideration, the Society, whose organ I am this day, has decided to put to the assembly the subject: *Of the influence of cultivation upon Medicinal Plants*. We are especially desirous that to the data already acquired by science and well known to all, may be added chemical, pharmaceutical, and clinical experiments, in order to determine in a material and irrefragable manner the real and comparative values of wild and cultivated plants, so as to put an end to the vagueness and confusion which the practitioner meets with when he wishes to employ any medicinal plant. It is on this ground that the Society invites practitioners desirous of proving their zeal for science, to lend the support of their experience to therapeutics and pharmacology, in order to enlighten the medical

world upon a state of things which tends to lead the physician astray, as well as to compromise the health of his patients."

In presenting the above abstract to our readers we must beg them to notice that we do not endorse all the statements therein made; those more particularly which have reference to the cultivators of medicinal plants in France, are most certainly not applicable to the very intelligent body of men who devote their time, abilities, and money to the cultivation of such plants in this country. Nevertheless, the paper is eminently suggestive, and the statements of its author should be carefully considered by all who take an interest in the growth of medicinal plants. The opinion entertained upon the comparative medicinal activity of wild and cultivated plants by the framers of the London Pharmacopœia is, "that the herb which grows spontaneously in hedges and in uncultivated places, is to be preferred to that cultivated in gardens." At present, however, it must be admitted that no satisfactory evidence can be adduced of the greater activity of wild plants; indeed, Dr. Christison states, that "from experiments made some years ago at the Royal Infirmary in Edinburgh, with henbane, the inferiority of cultivated plants, if it exists at all, seems not appreciable in practice." According to Mérat, however, the superior activity of wild henbane has been demonstrated in Germany. Further experiments upon the comparative activity of wild and cultivated herbs are therefore required before we can arrive at any positive conclusions upon the subject. With regard to valerian, however, we entertain no doubt as to the greater activity of the wild herb.

The following extract from *Bentley's Manual of Botany*, page 785, has also direct bearings upon the matter in question. Thus, after alluding to the effects of the varying intensity of heat, light, etc., upon the formation of the secretions of plants, Professor Bentley says:—"At present, much remains to be discovered before we can be said to have anything like a satisfactory explanation of the causes which influence the formation of the secretions of plants; for it is found that the same plants when grown in different parts of Great Britain, where the climatal differences are not strikingly at variance, or even at the distance of a few miles, or in some cases a few yards, frequently vary much as regards the nature and activity of their peculiar secretions. A striking illustration of this fact is mentioned by Dr.

Christison, who found that some umbelliferous plants, as *Cicuta virosa* (Water Hemlock), and *Enanthe crocata* (Hemlock Water Dropwort), which are poisonous in most districts of England, were innocuous when grown near Edinburgh. The causes which lead to such differences are at present obscure, but the varying conditions of soil and moisture under which such plants are grown, have doubtless an important influence upon their secretions. In a pharmaceutical point of view, so far as the active properties of the various medicinal preparations obtained from plants are concerned, this modification in the secretions of plants by such causes is of much interest, and would amply repay investigation, for it cannot be doubted but that each plant will only form its proper secretions when grown under those circumstances which are natural to it, and that consequently any change from these conditions will modify to some extent the properties of the plant. I cannot but believe that here we have an explanation, to some extent at least, of the cause of the varying strength of medicinal preparations obtained from plants grown in different parts of this country, or in different soils, etc."

If future experiments should demonstrate in a conclusive manner that wild plants are more active than those under cultivation, it will be necessary to ascertain what are the conditions of heat, light, exposure, soil, moisture, etc., which are most favorable to the full development of the medicinal properties of each plant, in order that the cultivator may place them, as far as he is able, under such conditions. Many of our medicinal plants are now employed so extensively that they could not be obtained in any proportion to the demand for them from wild localities, and hence cultivation must be resorted to to keep up the necessary supply. In conclusion, we would urge upon our cultivators of medicinal plants to study to place the plants they cultivate, in as nearly as can be ascertained at present, their natural condition, and then we have no fear that their medicinal properties will be sensibly diminished; indeed, we see little reason to doubt, that as our knowledge of vegetable physiology and chemistry increases, when the conditions under which the different secretions of each particular plant have been thoroughly investigated, we may increase rather than diminish their active properties by proper cultivation.—*London Pharm. Journ.*

## Abstract of the Minutes of the Philadelphia College of Pharmacy.

The Forty-first Annual Meeting was held 31st of Third month, 1862, at the Hall of the College. Present, 23 members.

The President in the Chair. The minutes of the last meeting were approved.

The Minutes of the Board of Trustees for the past six months were read. W. Ralph Higgenbotham has been elected an associate member, and William R. Thompson a resident member, of the College, by the Board.

The Annual Commencement of the School of Pharmacy, was held at the Musical Fund Hall, on the 13th inst., when the following gentlemen received the degree of Graduate in Pharmacy at the hands of the President.

NAME.	RESIDENCE.	SUBJECT OF THESIS.
William M. Allen, .....	Philadelphia, Pennsylvania, ..	Eupatorium Perfoliatum.
Henry Blithe, .....	Montgomery, ..	Chemistry.
Albert P. Brown, .....	Philadelphia, ..	Matico.
W. G. Buchanan, .....	" "	{ Relative amounts of Extract in Com- mercial Aloes.
Edward D. Chipman, .....	Frankford, ..	Baptisia Tinctoria.
Charles D. Collem, .....	Philadelphia, ..	Cornus Florida.
William H. Cooper, .....	Greensboro, .. Maryland, ..	Cytisus Scoparius.
Robert W. Dickson, .....	Philadelphia, Pennsylvania, ..	Agathotes Chiraya.
C. Lewis Diehl, .....	Chicago, .. Illinois, ..	Salvia Officialis.
Edward T. Dobbins, .....	Philadelphia, Pennsylvania, ..	Anthemis Nobilis.
Marous C. Fetter, .....	Bethlehem, ..	Asparagus Officialis.
Theophilus Fisher, .....	Philadelphia, ..	"
Richard T. Hand, .....	Cape May, .. New Jersey, ..	Phytolacca Decandra.
George Hansell, .....	Rancocas, ..	" .. Iodinium.
Molton B. Hornbeck, .....	Allentown, .. Pennsylvania, ..	Lactacarium.
Henry H. Jacobs, .....	Philadelphia, ..	Root of Panax Quinquifolium.
Henry W. Leslie, .....	Bristol, ..	{ Fluid Extract of the Bark of Pomegran- ate Root.
Adolph W. Miller, .....	Saint Paul, .. Minnesota, ..	Anemone Ludoviciana.
Wesley W. Mullen, .....	Philadelphia, Pennsylvania, ..	Rubus Villosus.
William H. Naulty, .....	" "	Chemistry and Drugs.
George R. Parry, .....	" "	Gillenia Trifoliata.
H. T. Peck, .....	" "	Monsel's Salt.
T. A. Rex, .....	" "	Ferri Subcarbonas.
Christian Schmidt, .....	Baltimore, .. Maryland, ..	Saponification.
Theodore A. St. Clair, .....	Philadelphia, Pennsylvania, ..	Radix Galangal Minoris.
Jacob Sennett, .....	" "	Chimaphila Umbellata.
Richard M. Shoemaker, ..	" "	Arnica Montana.
Bennet L. Smedley, .....	Delaware Co., ..	Baptisia Tinctoria Radix.
George M. Smyser, .....	York, ..	Ptelea Trifoliata.
Clayton N. Wills, .....	Rancocas, .. New Jersey, ..	{ Relative quantities of oil in the long and short leaf Buchus.
David L. Witmer, .....	Philadelphia, Pennsylvania, ..	Helianthemum Canadense.

The Report of the Committee appointed at the Semi-Annual Meeting to obtain and forward specimens of our indigenous materia medica to the International Exhibition in London, was read and accepted, and ordered to be published. See Appendix, page 277.

A full report from the Committee appointed at the recent special meeting of the Board of Trustees, to confer with the Committee of Ways and Means of the House of Representatives at Washington, upon the provisions of the "Bill to provide internal revenue to support the government and pay the interest on the public debt," was received and ordered to be engrossed for publication in the Journal. See Appendix, page 280.

The Committee of the Board of Trustees in charge of the College Cabinet of specimens of materia medica, chemicals, &c., made a communication with reference to the extension of this important collection, and especially to adding a chemical section to the Museum of the College; it was referred for publication in the Journal. See Appendix, page 284.

The following Report, and also the Statement of the Treasurer of the Committee, were read and accepted.

The Publishing Committee Report, that during the past year the "Journal" has been regularly issued to subscribers without reduction of size. Owing to causes which had not been fully developed at our last Annual Report, the subscription list was suddenly cut short several hundred copies, by the cessation of the mail connections with the Southern States, and since then the general depression of business in other portions of the Union has materially interfered with the continuance of the patronage of many who feel it needful to decrease their expenses.

The natural result was, first, that the finances of the Journal fell behind-hand, and from an overflowing treasury, yielding occasional aid to other branches of the operations of the College, it was on the 1st of April, 1861, in debt to the Treasurer \$229.40. Since then, the causes before alluded to operating with increased force, the committee determined to resort to retrenchment of expenses for the year commencing January 1, 1862: 1st by cutting down the number of copies printed; and 2d, by reducing the Editorial expenses. Meanwhile the Treasurer, by urging the attention of those in arrears, and agents of the Journal, has increased the collections; and, on the whole, the finances are in a more favorable condition than at last report.

Respectfully submitted,

W. PROCTER, Jr.

EDWARD PARRISH,

C. ELLIS,

A. B. TAYLOR,

JOHN M. MAISCH,

} Committee.

The Committee on Latin Labels made their Annual Report, accompanied by an exhibit of the state of the funds at this date, showing a cash balance now in their hands, and an unsold stock of labels. As the stock of bronzed labels is small, it is proposed to publish a new edition the current year.

The Committee on Sinking Fund reported, that owing to the difficulties of the times they have not thought it expedient to make any further payment the past year toward the liquidation of the mortgage on the College Hall. They report a balance in hand of \$74.13, which on motion of S. F. Troth is directed to be appropriated as follows: towards the Library Committee for purchase of books and binding of periodicals \$50; toward the Committee on Cabinet \$24.13.

On motion of Charles Bullock,

It being very desirable that the College Cabinet should be placed in as perfect a condition as our means will permit, in order to serve the purposes of our flourishing School of Pharmacy, therefore

*Resolved*, That an annual appropriation of \$20 be placed at the disposal of the Committee on Cabinet for the furtherance of that important purpose.

A communication was received from J. Henry Abbott, stating that he is no longer engaged in the drug and apothecary business, and desiring to resign his membership in the College. On motion it was accepted.

On motion of Edward Parrish, it was unanimously *Resolved*, That the American Pharmaceutical Association is hereby invited to hold the annual meeting of the current year in this city; that the use of the Hall of the College is hereby tendered for its meetings; and that in the event of this invitation being accepted, the Board of Trustees is requested to make such arrangements as may be required.

The annual election was now ordered, W. J. Jenks and S. S. Bunting acting as tellers. They reported the following duly elected:

<i>President</i> , . . . . .	Charles Ellis.
<i>1st Vice-President</i> , . . . . .	Samuel F. Troth.
<i>2d Vice-President</i> , . . . . .	Dillwyn Parrish.
<i>Treasurer</i> , . . . . .	Ambrose Smith.
<i>Recording Secretary</i> , . . . . .	Edward Parrish.
<i>Corresponding Secretary</i> , . . . . .	William Procter, Jr.

*Trustees.*

Dr. R. Bridges,	D. S. Jones,
J. C. Savery,	T. Morris Perot,
T. S. Wiegand,	S. S. Bunting,
S. N. James,	J. T. Shinn.

*Publishing Committee.*

Charles Ellis,	W. Procter, Jr.
Edward Parrish,	A. B. Taylor,
John M. Maisch.	

*Committee on Sinking Fund.*

S. F. Troth,	Ambrose Smith,	E. Parrish.
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*Delegates to the American Pharmaceutical Association.*

Samuel F. Troth,	Elias Durand,
Daniel B. Smith,	Edward Parrish,
James T. Shinn,	

Then on motion adjourned.

EDWARD PARRISH, *Secretary.*



SUPPLEMENT  
TO THE  
MINUTES OF THE PHILADELPHIA COLLEGE OF PHARMACY.

MARCH 31, 1862.

*Report of the Committee on the World's Fair Deposit.*

*To the College:—*

The Committee consisting of Charles Ellis, Thomas P. James, Prof. R. Bridges, Prof. Thomas, Prof. Procter, F. L. John, Alfred B. Taylor, J. M. Maisch, T. S. Wiegand, James T. Shinn, W. Evans, Jr., Charles Bullock, W. C. Bakes, W. R. Warner, John E. Carter, and the undersigned, appointed at the Semi-annual Meeting, in September last, to obtain and forward specimens of our indigenous *materia medica*, &c., to the International Exhibition to be held in London, during the current year,—

*Report*, that they met soon after their appointment, and by adjournments on ten different occasions, till the afternoon of the 26th ult., when they adjourned *sine die*. Wm. C. Bakes served the committee efficiently as Secretary and Treasurer, and received its thanks at the close of his labors.

Through the liberality of the New England Glass Company we obtained the use of a remarkably fine selection of their superior ware, embracing all the necessary bottles for displaying the specimens, on favorable terms.

An ample list of our indigenous and a few important naturalized medicinal plants being prepared, an experienced herbalist was engaged to collect such of them growing in the vicinity as the lateness of the season would allow; others were purchased of dealers in this city, a few were contributed by William S. Merrill, of Cincinnati, and a large number by members of the Committee; making in all a collection of 148 specimens of the vegetable *materia medica*. These being collected, carefully dried, and garbled at the College, were mounted and appropriately labelled, each with its botanical name and one or more synonyms.

This agreeable and instructive labor was performed by several members of the Committee with great care to avoid errors and to display the distinctive characteristics of each specimen. By the use of half-gallon bottles of different shapes, some plants were retained almost entire, and whenever practicable, leaves and seed vessels accompanied specimens of the other parts of plants.

Through the kindness of Frederick L. John, of the College, we have been furnished with an extensive Herbarium of American Plants, which is designed to accompany the Cabinet of Specimens.

An incidental advantage secured by this undertaking is a large increase of the College Cabinet from specimens collected by this Committee.

The Committee of revision engaged upon the new edition of the *National Pharmacopœia*, responded to our request for such of the new official formulæ as would best illustrate the peculiarities of American Pharmacy,

by furnishing us with all that had been fully determined upon, which were considered sufficiently novel or characteristic. These were allotted to a sub-committee—Messrs. Shinn, Parrish, Bullock, Taylor, Wiegand, Warner and Scattergood, who accordingly produced samples of 48 pharmaceutical products, prepared by the formulæ about to be made official; these embraced 21 fluid extracts, a class of preparations peculiar to our Pharmacopœia.

The preparations were neatly put up and labelled uniformly with the *materia medica* specimens for exhibition, thus making the whole cabinet number about 200 specimens.

Owing to the angry discussions and ill feeling, growing out of the "Trent affair," threatening a rupture between our government and that of Great Britain, the legislation required to provide for sending specimens to the exhibition was defeated in the House of Representatives, so that hundreds of our citizens were doubtless discouraged from any attempt to display the products of their skill, and it became necessary for us to provide for the expenses of freight and transhipment, for the erection of the necessary shelving and for the supervision of the specimens while on exhibition. For these, and other expenses pertaining to the undertaking, of which a statement accompanies this report, the necessary appropriation was made by the Board of Trustees from the funds of the College. It is our intention to offer the specimens for sale at the close of the Exhibition, so as to refund the expenses thus incurred.

While your Committee regret that the unfavorable season of the year prevented their obtaining some interesting and valuable specimens, they feel that it is cause of congratulation, that so fair a collection of American plants is placed within reach of European pharmacologists.

Respectfully submitted,

EDWARD PARRISH, Chairman.

*List of Specimens in the collection deposited by the Philadelphia College of Pharmacy, in the Industrial Exhibition of all Nations, London, 1862.*

IN HALF GALLON SALT MOUTH BOTTLES.

Aralia Nudicaulis—root.	Lobelia Inflata—herb.
Chenopodium Anthelminticum—herb.	Lobelia Syphilitica—herb.
Chelone Glabra—herb.	Monarda Punctata—herb.
Cimicifuga Racemosa—root.	Magnolia Glauca—bark and leaves.
Celastrus Scandens—fruit.	Menispermum Canadense—root and leaves.
Comptonia Asplenifolium—leaves.	Nicotiana Tabacum—leaves.
Dracontium Fœtidum—root and fruit.	Orobanchè Virginiana—plant.
Euonymus Atropurpureus—leaves and fruit.	Ricinus Communis—leaves.
Rupatorium Perfoliatum—herb.	Solidago Odora—herb.
Gillenia Trifoliata—root.	Thuja Occidentalis—leaves.
Hamamelis Virginica—bark leaves &c.	Triosteum Perfoliatum—herb.
Hedeoma Pulegioides—herb.	" " root.
Hypericum Perforatum—herb.	Tephrosia Virginiana—root.
Ilex Opaca—leaves.	Xanthoxylum Clava Herculis—bark.

## IN QUART SALT MOUTH BOTTLES.

*Asclepias Incarnata*—plant.  
*Asclepias Tuberosa*—root.  
*Asclepias Syriaca*—root and fruit.  
*Aristolochia Serpentaria*—root.  
*Aristolochia Reticulata*—root.  
*Apocynum Cannabinum*—root.  
*Apocynum Androsaemifolium*—root.  
*Adiantum Pedatum*—herb.  
*Ambrosia Trifida*—leaves.  
*Aralia Racemosa*—root.  
*Asarum Canadense*—root.  
*Anagallis Arvensis*—plant.  
*Achillea Millefolium*—herb.  
*Baptisia Tinctoria*—root.  
*Betula Lenta*—bark.  
*Benzoin Odoriferum*—bark  
     "       "       leaves and fruit.  
*Cornus Florida*—bark.  
*Caulophyllum Thalictroides*—plant.  
     "       "       root.  
*Ceanothus Americanus*—root.  
     "       "       leaves.  
*Convolvulus Panduratus*—root.  
*Cicuta Maculata*—root and leaves.  
*Cerasus Serotina*—bark.  
*Cassia Marilandica*—leaves.  
*Cephalanthus Occidentalis*—bark.  
*Chimaphila Maculata*—leaves.  
*Chimaphila Umbellata*—leaves.  
*Cunila Mariana*—herb.  
*Coptis Trifolia*—root.  
*Dioscorea Villosa*—root.  
*Datura Stramonium*—leaves.  
     "       "       root.  
*Diervilla Canadense*—herb.  
*Diospyros Virginiana*—bark.  
*Erigeron Philadelphicus*—herb.  
*Erigeron Canadense*—herb.  
*Euphorbia Hypericifolia*—herb.  
*Epigea Repens*—plant.  
*Frasera Walteri*—root.  
*Geranium Maculatum*—root.  
*Gossypium Herbaceum*—root.  
*Gillenia Stipulacea*—root.  
*Gaultheria procumbens*—herb.

*Gnaphalium Margaritaceum*—herb.  
*Hydrastis Canadensis*—root.  
*Helianthemum Corymbosum*—herb.  
*Helianthemum Canadense*—herb.  
*Hydrangea Arborascens*—root.  
*Hepatica Triloba*—herb.  
*Iris Versicolor*—root.  
*Juniperus Virginiana*—tops.  
*Juglans Cinerea*—bark of root.  
*Juglans Nigra*—bark.  
*Kalmia Latifolia*—leaves.  
*Liriodendron Tulipifera*—bark.  
*Liquidambar Styraciflua*—bark.  
*Leontodon Taraxacum*—root.  
*Mitchella Repens*—herb.  
*Nepeta Cataria*—herb.  
*Nymphaea Odorata*—herb.  
*Osmorrhiza Longistylis*—root.  
*Polytrichum Juniperum*—plant.  
*Phytolacca Decandra*—root.  
     "       "       berries.  
*Podophyllum Peltatum*—root.  
*Panax Quinquefolium*—root.  
*Populus Tremuloides*—bark.  
*Polygala Senega*—root.  
*Ptelea Trifoliata*—leaves and fruit.  
*Polygonum Punctatum*—herb.  
*Quercus Alba*—leaves and bark.  
*Rhus Glabrum*—fruit.  
*Rhus Radicans*—root, leaves and seed.  
*Robinia Pseudoacacia*—bark.  
*Ranunculus Bulbosus*—root and herb.  
*Smilax Sarsaparilla*—root.  
*Scutellaria Lateriflora*—herb.  
*Sassafras Officinale*—pith.  
     "       "       bark.  
*Stillingia Sylvatica*—root.  
*Sanguinaria Canadensis*—root.  
*Sabbatia Angularis*—herb.  
*Sesamum Orientale*—leaves.  
*Trillium Pendulum*—root.  
*Veratrum Viride*—rhizome.  
*Xanthorrhiza Apiifolia*—root.  
*Ulmus fulva*—bark.  
     Not inclosed.

## IN PINT AND HALF PINT SALT MOUTH BOTTLES.

*Arum Triphyllum*—corm.  
*Aralia Spinosa*—bark.  
*Alnus Serrulata*—bark.  
*Cypripedium Pubescens*—root.  
*Corydalis Formosa*—root.  
*Cornus Sericea*—bark.  
*Collinsonia Canadensis*—root.  
*Cantharis Vittata*.  
*Datura Stramonium*—seeds.  
*Daucus Carota*—seeds.  
*Euoonymus Atropurpureus*—bark.  
*Gaultheria Procumbens*—fruit.  
*Gossypium Herbaceum*—seed.  
*Helonias Dioica*—root.

*Helianthus Annuus*—seed.  
*Lappa Minor*—seed.  
*Lobelia Inflata*—seed.  
*Myrica Cerifera*—bark.  
*Polygonum Acre*—herb.  
*Prinos Verticillatus*—bark.  
*Punica Granatum*—bark of root.  
*Populus Balsamea*—buds.  
*Pinus Strobus*—bark.  
*Sesamum Orientale*—seed.  
*Viburnum Oxycoccus*—bark.  
*Verbena Hastata*—flowering tops.  
*Xanthoxylum Fraxineum*—bark.  
*Xanthoxylum Fraxineum*—fruit.

## PREPARATIONS.

## IN TINCT. BOTTLES.

Acetum Lobeliæ.  
 " Sanguinaris.  
 Ext. Buchu Fluidum.  
 " Cimicifugæ, Fl.  
 " Colchici Sem. Fl.  
 " " Rad., Fl.  
 " Dulcamaræ Fluid.  
 " Ergotæ Fluidum.  
 " Gentianæ Fluid.  
 " Hyoscyami, Fl.  
 " Ipecacuanhæ, Fl.  
 " Lupulinæ Fluid.  
 " Rhei Fluidum.  
 " Sarsaparillæ Fluid.  
 " Sarsaparillæ Comp. Fl.  
 " Spigeliæ Fluidum.  
 " Sennæ Fluidum.  
 " Serpentariæ, Fl.  
 " Taraxaci, Fl.  
 " Valerianæ, Fl.  
 " Veratri Viride, Fl.  
 " Pruni Virginianæ, Fl.  
 " Zingiberis Fluid.  
 Cerat. Cantharidis Extracti.

Ceratum Sabinae.  
 Emplastrum Arnicæ.  
 Emplast. Picis Canadensis.  
 Extractum Arnicæ.  
 " Senegæ.  
 Ferri et Ammon Sulphas.  
 " " Tartras.  
 Glycerina.  
 Liquor Ferri Citratis.  
 " Guttæ Perchæ Chloroformic.  
 Oleum Lini.  
 " Ricini.  
 " Terebinthinæ  
 " Morrhuæ.  
 " Sesami  
 " Chenopodii.  
 " Erigeronis.  
 " Gaultheriæ.  
 " Menthæ Piperitæ.  
 " " Viridis  
 " Monardæ.  
 " Sassafras.  
 Resina Jalapæ.  
 " Podophylli.

## REPORT ON THE INTERNAL REVENUE LAW.

To the Philadelphia College of Pharmacy :

The undersigned who, though appointed at a Special Meeting of the Board of Trustees, were directed to report to the Annual Meeting of the College, recently proceeded to Washington under instructions from the Board, to confer with the Committee of Ways and Means of the House of Representatives in relation to the "Bill to provide internal revenue to support the government and pay interest on the public debt."

Our objections against the Bill related chiefly to *Section 101 and Schedule C*, which are as follows :

Sec. 101. *And be it further enacted*, That, on and after the date on which this act shall take effect, no person or persons, firms, companies, or corporations, shall utter or vend drugs, medicines, preparations, compositions, articles, or things upon which a duty is imposed by this act, as enumerated and mentioned in Schedule C, without affixing thereto an adhesive stamp or label denoting the duty before mentioned, and in default thereof shall incur a penalty of ten dollars: *Provided*, That nothing herein contained shall apply to any medicinal drug sold entire and without mixture or composition with any other drug, fluid, essence, spirit, or other form or denomination of medicine or drug, nor to medicines compounded according to the forms prescribed in the United States Pharmacopœia, Wood and Bache's Dispensatory, or any homœopathic or other professional text books now in use of like character, and not sold, offered for sale, or advertised under any other name, form, or guise than that under which they may be severally denominated and laid down in said Pharmacopœias and Dispensatories and text books, as aforesaid, nor to medicines sold to or for the use of any person which may be mixed and compounded according to the written recipe or prescription of any physician or surgeon practicing his profession in the vicinity where such medicine, so prescribed, shall

be compounded and sold, and specially for such person prescribing said medicine.

#### SCHEDULE C.

Medicines, for and upon every packet, box, bottle, pot, phial, or other enclosure, containing any drugs, herbs, pills, powders, tinctures, potions, cordials, bitters, anodynes, tonics, plasters, liniments, salves, ointments, drops, waters, essences, spirits, oils, or other preparation or composition whatsoever, used or applied, or to be used or applied, externally or internally, as medicines or medicaments, for the prevention, cure or relief of any disorder or complaint incident to or in anywise affecting the human or animal body; which shall be uttered or sold in the United States where such packet, box, bottle, pot, phial, or other enclosure, with its contents, shall exceed at the retail price or value the sum of twenty five cents.....Duty 3 cts.

Where such packet, box, bottle, pot, phial, or other enclosure, with its contents shall exceed the retail price or value of twenty-five cents, and not exceed the retail price or value of fifty cents.....5 cts.

Where such packet, box, bottle, pot, phial, or other enclosure with its contents, shall exceed the retail price or value of fifty cents, and shall not exceed the retail price or value of one dollar.....10 cts.

Where such packet, box, bottle, pot, phial, or other enclosure, with its contents, shall exceed the retail price or value of one dollar, for each and every fifty cents, or fractional part thereof, over and above one dollar, as before mentioned, an additional.....5 cts.

#### SCHEDULE OF DRUGS, HERBS, PILLS, POWDERS, TINCTURES, POTIONS, CORDIALS, BITTERS, ANODYNES, TONICS, PLASTERS, SALVES, LINIMENTS, OINTMENTS, DROPS, WATERS, ESSENCES, SPIRITS, OILS, PREPARATIONS, AND COMPOSITIONS.

Aromatic snuff.	Dentifrice.	Pulmonic syrup.
Balm of a thousand flowers.	Epileptic pills.	Pectoral balsam.
Balm of life.	Essence of life.	Pulmonic wafers.
Balsam of wild cherry and Iceland moss.	Eye water.	Railroad pills.
Balsam of liverwort.	Family pills.	Ready relief.
Badger's cod liver oil	Female pills.	Richardson's bitters.
Brandreth's pills.	Glycerine lotion.	Russia salve.
British oil.	Hair restorative.	Scheidam schnapps.
Bull's sarsaparilla.	Hostetter's bitters.	Sherry wine bitters.
Burnett's cocoaine.	Hyperion fluid.	Sugar-coated pills.
Cathartic pills,	Hair dye.	Tonic mixture.
Catarrh snuff.	Magic liniment.	Tooth powder.
Cough syrup.	Old Dr. Jacob Townsend's sarsaparilla.	Vegetable pulmonary balsam.
Cough remedy.	Oxygenated bitters.	Vermifuge.
Croup syrup.	Pain-killer.	Worm lozenges.
	Pulmonary balsam.	

Or by whatsoever other name the same heretofore have been, now are, or shall hereafter be called, known or distinguished; and also all pills, powders, lozenges, tinctures, potions, cordials, bitters, tonics, alteratives, anodynes, pomades, liniments, embrocations, electuaries, plasters, unguents, salves, ointments, drops, panaceas, lotions, oils, spirits, medicated herbs and waters, chemical and officinal preparations whatsoever, of other or the same, or the like properties, qualities, virtues, efficacies, and pretensions, with the articles before mentioned, named, enumerated, or specified in this schedule, or any of them made, prepared, uttered, vended, or exposed to sale by any person or persons whatsoever, wherein the person making or preparing the same, has, or claims to have, any occult secret or art for the making or preparing the same, has, or claims to have, any exclusive right or title to the making or preparing the same, or which have at any time heretofore been, now are, o

shall hereafter be prepared, uttered, vended, or exposed to sale under the authority of any letters patent, or which have at any time heretofore been, now are, or shall hereafter be, by any public notice or advertisement, or by any written or printed papers or handbills, or by any labels or words written, printed or affixed to, or delivered with any such packet, box, bottle, or phial, or other enclosure aforesaid, held out or recommended to the public by the makers, venders, or proprietors thereof, as nostrums, or proprietary medicines, or as specific, or as beneficial to the prevention, cure, or relief of any distemper, malady, ailment, disorders or complaint incident to or in anywise affecting the human or animal body.

It will be observed that besides the great superfluity of words in the schedule, it enumerates some articles as taxable which it was the evident design of Section 101 to exempt from any tax. Section 101 was also considered objectionable as limiting the preparations exempted from the tax to such as are compounded according to the forms prescribed in the U. S. Pharmacopœia, Wood & Bache's Dispensatory, or any homœopathic or other professional text books now in use of like character, thus drawing a distinction to the disadvantage of the numerous new remedies, the manufacturers of which, from their recent introduction, or from the neglect of the compilers of these books to include them in their formulæ, would necessarily either pay the stamp duty, or be liable to the charge of illegally avoiding it.

An error also occurs in the phraseology of Section 101, which, while the obvious intention of the law is to exempt all prescriptions regularly issued by physicians, excepts only such as "shall be compounded and sold for such person so prescribing said medicines." Of course this mistake needed only to be pointed out to be corrected.

The following proposed substitutions were submitted to the Committee and received with approval, though the final result can not be reached until this portion of the bill comes before the Committee of the Whole, and will then be only determined subject to the ultimate action of the House, and subsequently of the Senate and Executive :

Substitute in Sec. 101, the following, after the word *provided*.

That nothing herein contained shall apply to any uncompounded medicinal drug or chemical, nor to any medicine compounded according to the United States or other National Pharmacopœia, nor of which the full and proper formula is published in either of the Dispensatories, Formularies or Text Books in common use among Physicians and Apothecaries, including Homœopathic and Eclectic, or in any Pharmaceutical Journal now issued by any Incorporated College of Pharmacy ; and not sold or offered for sale, or advertised under any other name, form or guise than that under which they may be severally denominated and laid down in said Pharmacopœias, Dispensatories, Text Books or Journals as aforesaid, nor to medicines sold to or for the use of any person which may be mixed and compounded specially for said person, according to the written receipt or prescription of any Physician or Surgeon, (nor to perfumery and cosmetics, prepared by Apothecaries and sold by them to consumers at retail.)

In schedule C, we propose to insert the following after the title—

*Medicines or Preparations, made, prepared, uttered, vended, or exposed for sale by any person or persons whatsoever, wherein the person making or preparing the same has, or claims to have, any private formula, or occult secret or art for*

the making or preparing the same, or has or claims to have any exclusive right or title to the making or preparing the same, or which are prepared, uttered, vended, or exposed for sale under any letters patent, or held out or recommended to the public by the makers, vendors, or proprietors thereof as proprietary medicines, or as remedies or specifics for any disease, diseases or affections whatever, affecting the human or animal body, as follows :

Here follows the specification of the amount of duty in each case, given after the heading Schedule C., on page 281.

After which the remainder of the schedule beginning with a list of certain medicines, &c., may be omitted.

The subject of taxing perfumery and toilet articles being under discussion in the Committee, we were consulted in regard to the rates best suited to this form of preparation, and in view of their comparative costliness to the manufacturer, unhesitatingly recommended a lower rate of taxes than that contained in the schedule of proprietary medicines.

The distinction proper to be observed between apparatus for the recovery of alcohol which has been previously used in manufacturing, and stills used directly in the manufacture of spirits was also pointed out to the Committee, and a clause protecting the former from the heavy license indicated in the bill was presented for the acceptance of the Committee.

The clause levying an additional tax upon spirits redistilled, mixed, adulterated, or prepared to be sold as brandy, gin, wine, &c., was amended by striking out the word *redistilled*, so that alcohol for use in the arts, having once paid the excise duty of 15 cents per gallon for proof, &c., is not subjected to further taxation.

Whatever may be the final action of Congress upon these subjects we shall feel that the College has done its part to protect the interests of legitimate pharmacy and its collateral branches.

The Committee were assisted by our fellow member, Thomas P. James, who accompanied us as the representative of the *Drug Exchange*, of this city, and was specially charged with the subject of the tax on redistilled spirits, last referred to, and the subject of licenses as applied to the sale of spirits, and of snuff and segars by druggists in executing orders from retailers in the country.

We refer with satisfaction to the respectful attention given to all the suggestions presented by us, as representatives of this College, and to the urbane deportment manifested towards us by the distinguished members of this important Committee.

Respectfully submitted,

EDWARD PARRISH,  
CHARLES BULLOCK.

NOTE.—Since the date of this Report, the Bill to which it refers has passed through the Committee of the Whole, been reported to the House and adopted. The modification of Schedule C., proposed by us has been adopted with a separate paragraph fixing a stamp tax on perfumery.

The rate of taxation on proprietary and secret medicines has been reduced as follows:—On articles retailing at 25 cents or under, 1 cent; exceeding 25, and not exceeding 50 cents, 2 cents; exceeding 50 cents and not exceeding 75 cents, 3 cents; exceeding 75 and not exceeding \$1.00, 4 cents; and in like proportion for those retailing for more than one dollar. The rates for perfumery, cosmetics, hair preparations, &c., are the same. The stamps to be affixed by the manufacturer, and to be cancelled by the retailer at the time of selling, under heavy penalties.

Section 101 has been adopted nearly as proposed by us, the last two lines (enclosed in brackets on page 282) having been omitted.

The clause affixing an additional duty on spirits mixed or rectified for sale as drinks, has been modified by omitting the word *re-distilled*, as suggested in the report, so that alcohol for use in the arts, or in Pharmacy, escapes any further duty than the original fifteen cents a gallon for proof affixed, equally on all forms of distilled spirit. The rates have been increased on all sold as brandy, rum, gin, or wine, to thirty cents a gallon on the basis of first proof, and so in proportion for any greater strength. The exception asked by the Committee, in favor of stills used for the recovery of alcohol, as mentioned in the report, though not inserted in the bill in the House, has, we believe, been recommended to the Senate Committee, who now have the whole subject under consideration. E. P.

#### REPORT ON THE CABINET OF THE COLLEGE.

To the Philadelphia College of Pharmacy.

The undersigned, a Committee of the Board of Trustees on the Cabinets of the College, are aware that in their official capacity they have no direct relation with the College in its annual meeting, yet as members feeling an interest in this hitherto much neglected branch of our operations, they take the liberty to offer the following statement for the information of the members generally, hoping through its means to elicit more interest towards the now respectable collection of specimens which form the nucleus of our Pharmaceutical museum. In 1851, an appropriation was made for the commencement of a cabinet of materia medica specimens, so far as to provide cases and glassware. By contributions from the members, the bottles were filled with specimens, and the collection was greatly increased in 1852, by a valuable contribution of East Indian drugs, by Dr. Royle, from those in possession of the East India Company, after the great Exhibition at London in 1851. In the spring of 1853, this collection was much injured, and most of the India specimens destroyed by a fire which occurred at that time, and since then little has been done to restore it, until the past winter. The College, by a previous appropriation of sixty dollars supplied several cases with glassware, and chiefly through the personal exertions of Professor Thomas, a large number



of these have been filled, with valuable specimens from his own cabinet. The residue of specimens obtained for the collection just sent to Europe were used, and others were the gifts of various members of the College. Contributions have been received or promised, from T. M. Perot & Co., Chas. Ellis & Co., T. P. James, Bullock & Crenshaw, John and T. Cramer, Edward Parrish, Dr. Bridges, and W. Procter, Jr. It is now proposed, in addition to the *materia medica*, to commence a collection of *materia chemica*, on such a basis as will enable the Committee, should their efforts be successful, to obtain for the College Cabinet a series of specimens that will add greatly to its value as a museum. The promotion of this last object is one which should interest the graduates of the College, and it is suggested to this now extensive body of pharmacutists, that they keep in remembrance the museum of their Alma Mater, as from time to time chemical and other specimens come into their possession. We would also invite the aid of our manufacturing chemists for this object by such contributions of chemical specimens as they may feel disposed to make.

The Committee before closing would suggest, where members have rare and valuable specimens, which, for special reasons, they decline to part with, that they simply *deposit* them in the museum during their own pleasure, each of such specimens being labelled, to indicate its temporary ownership by the College, with the name of the depositor.

W. PROCTER JR.,  
R. BRIDGES,  
AMBROSE SMITH.

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## AMERICAN PHARMACEUTICAL ASSOCIATION.

### NOTICE.

The adjourned meeting of the Association, which was to have been held last year at St. Louis, and postponed in consequence of the disturbed condition of the country, will be held at the City of Philadelphia, on Wednesday the 27th of August next, at 3 o'clock, P. M.

It is most earnestly recommended to *all* the members to keep in view the important interests of the Association—to the several Committees, and especially those members and others appointed at the meeting held at New York, in 1860, to whom was referred the investigation of special subjects, to be ready to make their reports at the coming session of the Association.

The objects of the Association and the conditions of membership are explained in the *first and second articles* of the Constitution as published in the Proceedings of 1860, and in the several Pharmaceutical Journals.

H. T. KIERSTED, *President*.

New York, April 12th, 1862.

## Editorial Department.

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**THE AMERICAN PHARMACEUTICAL ASSOCIATION.**—By reference to page 285 our readers will find the official announcement of President Kiersted of the meeting of this body, to be held in August next. Now that this important preliminary is settled, the Chairman of the Executive Committee earnestly requests all those members who have written reports on scientific subjects to make, to begin early and secure to the meeting a full contribution of interesting papers, and to use such care in copy as will in great measure prevent errors of the press, and save the editor a vast amount of trouble and annoyance. From the Special Committees, interesting reports may be looked for on Adulterations and Poisons. The large Committee to promote the St. Louis meeting, of course find their occupation gone, but they may direct their forces towards Philadelphia. Dr. Squibb, Chairman of the Business Committee, will, doubtless, as usual, be found wide awake when the time for action arrives.

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**REVISION OF THE FRENCH CODEX.**—In the early part of 1861, The Society of Pharmacy of Paris instituted a discussion of various classes of preparations in the Codex, with a view to the probable revision of that work; and already the subjects of mineral waters and syrups have occupied many pages of the *Journal de Pharmacie*. During this period the necessity of a new edition of the Codex having been brought to the notice of the proper authorities, according to the Law of the 11th year of the Republic, viz. the minister of Agriculture, Commerce and Public Works, E. Rouher, and the minister of Public Instruction, M. Rouland; these officers made a report to the Emperor, on the subject, giving the reasons why a revision should be carried out, which report was approved by the Emperor at Fontainebleau, June 20, 1861. In accordance with that Report, a decree was issued on the 11th of December, directing—1st, that a special Commission be made by the Minister of Public Instruction, who should at once engage in the revision of the Codex of 1837; and 2d, that the Commission should consist of M. DUMAS, as *President*, and Professors Grisolle, Regnault, Tardieu, and Wurtz of the *Faculty of Medicine*, and Professors Bussy, Chatin, Guibourt, and Lecanu, of the *superior School of Pharmacy*; together with MM. Petit and Mourier of the Bureau, of Public Instruction, the latter to act as Secretary.

By a decree issued on the following day, MM. Robinet, Boudet and Gobley, of the Imperial Academy of Medicine, and MM. Mayet and Mialhe, pharmaciens of Paris, were added to the Commission. On the 22d of January, M. Dumas addressed a letter to the President of the Society of Pharmacy, inviting them to submit the result of their labor to the Commission. And on the 5th of February, M. Poggiale, President of the Society of Pharmacy, was also added to the Committee.

The Minutes of the discussions of the Society, are published in the *Journal de Pharmacie*, for January, February, and March, for the present year, and are full of interest.

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**THE CAVENDISH SOCIETY.**—The annual meeting of this Society, was held at Burlington House, London, March 1st, Thomas Graham, Esq., President in the Chair. The report of the Council was read by the Secretary, of which we give the following abridgment:

The operations of the Society are limited to the completion of Gmelin's Chemistry. They regret that, owing to the delay in bringing out the German edition, the Translator has not had material for the completion of the 15th volume, until quite recently, although promised six months ago. He is now progressing as rapidly as possible. The last part of the German edition promises a completion of the work the present year. If so, the Society hope to finish the English translation in the 16th volume, and then get out a general index of the whole, which will occupy another volume, and make the work complete.

The Council announce the republication of the first volume of Gmelin, which has been out of print, so that persons who have incomplete sets may thus render them perfect.

The financial condition of the Society is considered satisfactory; there are no outstanding debts, and a balance in hand of £375 15s. American subscribers will therefore be aware that the 15th volume will hardly be forthcoming before the Autumn, and meanwhile they should have their subscriptions for 1861 paid.

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**NEW YORK COLLEGE OF PHARMACY.**—From the Druggists' Circular, we are informed that this Institution has revived its energies during the past winter, not only in its school of Pharmacy, but in regard to the membership. Among the new features is that of *Monthly Conversational Meetings*, where scientific and professional subjects are discussed in a pleasant informal manner, like our own "Pharmaceutical Meetings." At the last meeting of the College, the degree of Graduate in Pharmacy was conferred on A. W. WEISSMANN, Jr., and GEORGE J. WAUGH, after which the annual election occurred, which resulted in the election of H. T. Kiersted President, John Milhau, John Meakim, and John Carle, Jr., Vice-Presidents, T. T. Green Treasurer, P. W. Bedford Secretary, and nine Trustees. They also elected Messrs. J. Milhau, John Meakim, J. W. Shedden, P. W. Bedford, and W. Wright, Jr., as delegates to the next meeting of the *American Pharmaceutical Association*.

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**MASSACHUSETTS COLLEGE OF PHARMACY.**—At a meeting of this Institution held recently in Boston, Thomas Hollis was elected President; Charles A. Tufts and Charles T. Carney, Vice-Presidents; Henry W. Lincoln, Recording Secretary; James S. Melvin, Corresponding Secretary; Ashel

Boyden, Treasurer; Samuel M. Colcord, Auditor; Daniel Henchman, and others, Trustees.

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THE GRADUATING CLASS OF 1862.—It is with pleasure that we chronicle an incident of the Commencement evening of the Philadelphia College of Pharmacy, March 13th, 1862. Just before the Professors, Trustees and Graduates elect left the room below the Musical Fund Hall, where the ceremony was to take place, George M. Smyser in the name of the Graduates of 1862, presented a portrait of Prof. Samuel Jackson, of the University, the oldest living ex-Professor of our School of Pharmacy, to the College, for the Museum of the Institution. The gift was received by Prof. Robert Bridges, Chairman of the Board of Trustees. The speaking on the occasion, though necessarily brief, was exceedingly appropriate, and marked with excellent feeling. We are informed that this is the first of a series of portraits with which, annually, it is intended to adorn the wall of our Museum.

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THE TAX BILL.—Those readers of this Journal who feel interested in the proceedings of Congress, relative to the tax bill, in its bearing on the sale of medicines, are referred to the report of a Committee of the Trustees of the Philadelphia College of Pharmacy, at page 280.

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JOURNAL AND TRANSACTIONS OF THE MARYLAND COLLEGE OF PHARMACY.—The April number of this Journal announces its suspension for the present, owing to pecuniary reasons. We regret this necessity believing that no Pharmaceutical Journal has ever raised its voice in favor of the right in our profession with greater consistency and soundness. When the political troubles which now afflict our country have terminated, and peace restores to their usual channels the numerous useful enterprises which war has suspended, we believe that our Baltimore friends will again speak forth in their own organ with an increased energy and a more brilliant fruitfulness.

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THE PHARMACOPOEIA WEIGHTS AND MEASURES.—The Committee of Revision have decided on retaining the use of Troy weight in the Pharmacopoeia, but have discarded the use of the terms *scruple*, *drachm* and *pound*. This has been done to avoid the difficulty arising from substituting the avoirdupois pound of 16 ounces for the Troy pound of 12 ounces. When any quantity less than half an ounce is directed, it is to be expressed in grains, but the final result adopted may differ from this arrangement. The Chairman of the Committee, Dr. Franklin Bache, is now engaged in the tedious and laborious duty of preparing the manuscript for the printer, that its language may present a homogeneous character throughout.

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NOTICE.—The continuation of Rochleder's Analysis, and several book notices, are in type, but have been crowded out by the College Reports.

THE  
AMERICAN JOURNAL OF PHARMACY.

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JULY, 1862.  
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ON ALKALINE IODIDES AND BROMIDES.

BY FERDINAND F. MAYER.

In preparing these salts, since a direct combination of the halogens with the alkaline metal is not practicable, they are usually combined with hydrogen or some less positive metal, from which the salts are then formed by being brought together with caustic or carbonated alkalies.

From the cheapness of the material, iron has most generally been selected to form the intermediate combination, various methods being employed to reduce the bulk of the precipitated oxyd, among which are that of the Dublin Pharmacopœia, and the process known as Griepenkoven's and Buchner's, which was originally suggested by Liebig.

These methods require partly caustic alkalies, and are rather circumstantial; and because the alkaline sulphates are always obtainable free from chlorides, which in the carbonates tend to deteriorate the quality of the product, Liebig has lately, in the instance of the iodides, recommended the preparation of calcium- or baryum salts, by saturation with hydriodic acid, as the intermediate stage, from which pure alkaline salts are readily obtained by precipitation, partly with the sulphates, partly, and to complete the reaction, with carbonates.

The hydriodic acid used for the purpose is its mixture with phosphoric, formed by the simultaneous action of phosphorus and iodine on water, and, as we have it from the accounts of M. Pettenkofer and W. S. Squire, the process is expeditious and not at all expensive. There are, however, several objections

to its use by the pharmacist especially for extemporaneous application. These objections, as well as any that might be raised against iron, I believe do not apply to the methods given below, in which metallic iron is retained in its old place.

#### PREPARATION OF IODIDES.

The alterations which I have introduced in the preparation of the iodides, and the bromides as well, intend to remove the necessity of using caustic alkalis, and shorten the process.

The formulas are founded on the following observations:

In Griepenkoven's method, a solution of ferrous iodide is in part oxydised by the addition of iodate or hypo-iodite of the alkali, the precipitated ferric oxyd forming magnetic oxyd with the ferrous oxyd precipitated afterwards by the addition of more alkali.

On the same principle, when to a solution of iodate or hypo-iodite containing free alkali, we gradually add a solution of a ferrous salt, there is at first a precipitation of brown ferric oxyd, which by the further addition of ferrous salt changes to magnetic oxyd.

When ferrous sulphate is used for this purpose, the result is magnetic oxyd, iodide and sulphate of the alkali.

When ferrous iodide is used, there results magnetic oxyd and alkaline iodide only.

Instead of a ferrous salt, metallic iron can be used to reduce the hypo-iodite or iodate. On bringing together fine iron filings with a solution of iodine in caustic alkali, containing an excess of iodine, and especially on applying heat, the iron is peroxydised, as it would be by a solution of a hypochlorite.

To test for the presence of iodic or hypo-iodous acid, the solution was filtered through one slip of filtering paper on another, and then touched with an alkaline solution of iodide potassium starch, and a second sample merely with starch and a drop of hydrochloric acid.

When precipitated ferric oxyd is heated with excess of iron filings, water is decomposed, its oxygen forming ferrous oxyd, which with the ferric oxyd forms the denser black, magnetic oxyd, while the hydrogen it set free.—[*Woehler and Preuss.*]

If this action of metallic iron in contact with ferric oxyd

takes place in an alkaline solution of a hypo-iodite, or iodate, but little hydrogen is set free until the oxysalts have been reduced to iodides.

On adding three equivalents of iodine to two of metallic iron under water, they form a brown solution of ferric iodide. That the third equivalent of iodine is held in chemical combination is proved by the fact, that on the addition of a caustic or carbonated alkali to this solution no hypo-iodous acid is formed, but a precipitation of ferric oxyd takes place, exactly as when adding a solution of alkali to one of ferric chloride.

When to this precipitated ferric oxyd more alkali is added, and then a solution of ferrous salt or iodide, ferrous oxyd is precipitated and forms with the other the black oxyd. If lime was the alkali, ferrous sulphate will form sulphate and iodide of calcium with magnetic oxyd.

If instead of adding a ferrous salt, the brown mixture is heated with excess of iron filings, hydrogen gas is evolved and black oxyd is formed.

It has been shown above that the oxyacids of iodine are reduced during this reaction. When therefore we mix four equivalents of iodine with two of metallic iron under water, and then add four equivalents of caustic alkali, or part carbonated and part caustic alkali, there results a mixture of ferric oxyd and hypo-iodite of the alkali, and when this is heated with iron filings, the result is simply magnetic oxyd and alkaline iodide.

The action of iodine on iron and water also takes place in a solution, or in the presence of a *carbonated alkali*. The iodide of iron as it forms is at once decomposed by the carbonate; carbonic acid escapes, and oxyd of iron and iodide of the alkaline metal remain.

By adding *three* equivalents of iodine to two equivalents of iron contained in a solution of four equivalents of carbonate of the alkali, and afterwards a solution of an equivalent of ferrous iodide, the products are black oxyd, iodide of the alkaline metal, and carbonic acid, which is given off.

By adding *four* equivalents of iodine to two of iron contained in a solution of four equivalents of carbonated alkali, and afterwards two equivalents or more of iron, the result is the same, but with this advantage, that the black oxyd is less hydrated and becomes denser on boiling.

When instead of using a solution of the carbonated alkali, the latter is added to the water in crystals of the bicarbonate of potassa or carbonate of soda, the reaction takes place as before; but the heat evolved by the combination of the iodine and iron will be reabsorbed for the solution of the crystals, and thus there will be no great increase of temperature, if any.

The action of ferric iodide on carbonate of lime and of lithia is the same as the other fixed alkaline carbonates, while that of ferrous iodide is but slow and incomplete. For the formation of iodide of calcium a fourth equivalent of iodine may be added in the form of ferrous iodide, and a fourth equivalent of alkali in the form of milk of lime. In the case of salt of lithium the proportion must remain three equivalents of carbonate of lithia, three of iodine, and two of iron, the change of the ferric oxyd to be brought about afterward by boiling with iron filings.

As it is understood that the new Pharmacopœia has adopted the bicarbonate of potassa for all such purposes, I have introduced it into the formulas; but in its place the purified carbonate can be used on a larger scale, or the sulphate of potassa, to precipitate the iodide of calcium in the same manner as directed by Liebig. For iodide of sodium we require nothing better than the crystallized carbonate of soda.

### *Iodide of Potassium.*

#### FIRST METHOD.

Take of Bicarbonate of Potassa	400 parts.
Iodine	508 "
Iron in filings	112 "
Water	a sufficient quantity.

Place the bicarbonate and iodine with three times their weight of water into a flask capable of holding twice the quantity; then add one half of the iron in portions, and when all the salt is dissolved, add the remainder of the iron, shake up, and boil until the precipitate has become dense. Then test whether the solution be free from iron by applying a drop of it to the uppermost of two small slips of filtering paper, one placed above the other, and touch what has filtered on the lower slip with a drop of solution of ferrocyanide of potassium. If this produce a blue stain, a little carbonate or bicarbonate of potassa must be added



to the mixture, until the reaction is no longer produced. Then filter while hot into a porcelain dish, wash the precipitate on the filter with some hot water, add the washings to the filtered solution, and evaporate to the point of crystallization, or to dryness when the salt is to be granulated by stirring after crystallization has begun.

## SECOND METHOD.

Take of Bicarbonate of Potassa	400 parts.
Iodine	508 “
Iron in filings	112 “
Water	a sufficient quantity.

Place the bicarbonate of potassa, with three-fourths of the iodine, and one half of the iron and sufficient water, into a flask or porcelain dish, and stir up until the salt is dissolved. In the mean time prepare in another glass vessel a solution of iodide of iron from the remainder of the iodine and iron and sufficient water : add this, sediment and solution, to the alkaline mixture, stir, boil up, test, and proceed as above.

[The latter method seems preferable for larger quantities; the resulting iodide of potassium should come within a trifle of the calculated amount.]

*Iodide of Sodium.*

Take of crystallized Carbonate of Soda,	572 parts
Iodine,	508 “
Iron,	112 “
Water,	a sufficient quantity.

Proceed precisely as above. There is generally a slight excess of carbonate of soda, owing to the efflorescence of the crystals, which is remedied by the addition of a small quantity of iodine or iodide of iron in solution. The filtered solution is best evaporated to dryness and granulated, on account of the deliquescent properties of the salt.

*Iodide of Lithium.*

Take of Carbonate of Lithia,	112 parts
Iodine,	381 “
Iron in filings,	112 “
Water,	a sufficient quantity.

Place the carbonate of lithia, rubbed fine, together with the

iodine, one half of the iron, and sufficient water, into a flask, and when all the iodine and lithia are dissolved, add the remainder of the iron, boil up, and proceed as directed for *Iodide of Sodium*.

*Iodide of Calcium.*

Take of Precipitated Carbonate of Lime, 200 parts.

Iodine, 381 "

Iron in filings, 112 "

Water, a sufficient quantity,

and proceed as directed for iodide of lithium.

From the iodide of calcium, or, if need be, iodide of baryum prepared in the same manner, all the other iodides are prepared by precipitation with the sulphates or carbonates of their respective metals.

[The carbonate of lime, which is added in excess and does therefore not all dissolve, must be free from chloride and magnesia. It is then preferable to burnt lime in the form of milk, as this is rarely free from the latter impurity. The coloration of these iodides when evaporated appears to be owing to the presence of iodide of magnesium, which is decomposed during that operation.]

*Preparation of Bromides.*

The action of bromine on caustic and carbonated alkalies, together with ferrous salts or metallic iron, is in every respect analogous to that of iodine. The proportions for the various salts, which are prepared precisely in the manner directed for the iodides, are as follows:

*Bromide of Potassium.*

Take of Bicarbonate of Potassa, 400 parts.

Bromine, 320 "

Iron in filings, 112 "

Water, a sufficient quantity.

*Bromide of Sodium.*

Take of Crystallized Carbonate of Soda, 572 parts.

Bromine, 320 "

Iron in filings, 112 "

Water, a sufficient quantity.

*Bromide of Lithium.*

Take of Carbonate of Lithia,	112 parts.
Bromine,	240 "
Iron in filings,	112 "
Water,	q. s.

*Bromide of Calcium.*

Take of Precipitated Carbonate of Lime,	200 parts.
Bromine,	240 "
Iron in filings,	112 "
Water,	a sufficient quantity.

*New York, June 9, 1862.*

## ON SULPHATE OF ANILIN.

BY WILLIAM PROCTER, JR.

The attention which has of late been given to the new dyes from coal tar products has developed much information on the subject of anilin, but the great pecuniary value which is placed on this information, in view of its use in the production of dyes, has prevented much of it from reaching the journals. At the last meeting of the British Association, Dr. Turnbull, of Liverpool, called attention to the sulphate of anilin as a therapeutic agent, and his short notice was transferred to page 62 of the present volume of this journal. Having been applied to for information regarding this salt, the following notice has been prepared with a view of satisfying it in a measure.

In the continuations of the elaborate paper of M. E. Kopp, on the preparation of artificial coloring matters from coal tar, published in this journal for 1861, will be found his directions for its extraction from coal tar, and its artificial preparation from benzole, also a product of coal tar. See this journal, March, 1861, pages 129 and 131. The separation of anilin from coal tar direct is a very complex troublesome process, but when derived from benzole, although a tedious process, requiring considerable skill, yet it is by no means so troublesome. If the benzole is nearly pure, nitro-benzole is easily produced by causing small streams of strong nitric acid and benzole to meet in a funnel tube which passes through a vessel of cold water, so as to

moderate the reaction. The resulting liquid should be washed first with water, then with a weak solution of carbonate of soda, and finally with water. I have found no difficulty in making it on a small scale by simply pouring slowly the two ingredients through a small glass funnel, passing through a cork into a precipitating glass without any refrigeration, except that caused by contact with the vessel. The benzole used was obtained from Atwood & Co., Waltham, Mass., but benzole sufficiently pure for this use is now made in Philadelphia. As, however, nitrobenzole is an article of commerce under the name of essence de mirbane, or artificial oil of bitter almonds, it will probably be more easy to commence with this substance, which is transformed into anilin by several processes.

*Preparation of Anilin.*—Anilin is prepared from nitrobenzole, 1st, by the action of sulphide of ammonium, on its alcoholic solution; 2d, by the action of nascent hydrogen when it is put in a vessel containing diluted sulphuric or muriatic acid and zinc, whereby that gas is slowly generated, gradually producing anilin, which combines with the excess of acid, and a resinous matter. The liquid thus obtained is saturated with caustic soda and distilled, when anilin and water are condensed. On trying this process it proved slow and troublesome and wasteful. 3d. Wöhler's process by the action of a hot alkaline solution of arsenious acid, the nitrobenzole being dropped in slowly, at once yields anilin, which distills over; when by precipitating it with oxalic acid and washing with alcohol, a pure oxalate results. 4th. The process of Béchamp (Annal. de Chim. et de Phys. serie 3d, xlii. p. 186,) by distilling together nitrobenzole, iron filings, and acetic acid, is suggested as the most eligible one for the pharmaceutist, with the proper precaution of using good materials and having thorough refrigeration to insure the rapid condensation of the vapors.

Take of Nitrobenzole, . . . . .	1000 grains.
Iron filings, . . . . .	1200 “
Concentrated Acetic acid, . . . . .	1000 “

Put the iron filings and nitro-benzole into a quart tubulated retort, adapt it to a receiver, and connect the receiver by a bent tube with a deep small-necked flask, into which it reaches nearly to the bottom. Having well refrigerated the neck of the retort,

the receiver and the flask, the last to be left loosely stopped with cotton, the acetic acid is poured in through the tubulure, which should be closed and tied. Reaction soon commences without the application of heat and becomes rapid, with quick rise of temperature and rapid ebullition, and a large portion of the products will be lost should the refrigeration be imperfect. The spontaneous distillate consists of anilin, acetate of anilin, and a little undecomposed nitro-benzole. When the retort has cooled these are returned to it from the receiver, and a careful sand bath heat applied until the residue in the retort is dry.

The distillate is now mixed with an excess of a solution of caustic potassa, when the hydrated anilin is separated and rises to the surface, whence it is to be removed and dried. It is sufficiently pure for medical purposes and yields a soft mass of crystals when mixed with sulphuric or muriatic acid, which dissolve in water. By this method, Béchamp states that in several trials he obtained as much anilin as equalled three-fourths of the nitro-benzole employed, and at a cost (in 1855) of two dollars a pound. (Chem. Gaz. vol. 13th, page 85.)

Anilin when pure is a colorless, thin oily liquid, but as usually seen in commerce has a more or less red color, sometimes as dark as bromine, arising from oxidation in part, and also from impurities. Its odor is peculiar; when pure not disagreeable, but often modified by other products so as to remind one of coal oil. Its density is stated as variously as 1.20 and 1.28. Its taste is acrid and pungent; it is but slightly soluble in water and does not crystallize at 4° below zero, F. It boils at 360° F. and distills unchanged. It is a powerful base, forming salts with a strong tendency to crystallize. Its basic power enables it to decompose the salts of iron, zinc, alumina, &c., like ammonia. It does not change the color of reddened litmus, or reddened turmeric, but changes dahlia blue to green. It oxidizes easily even under water, turning yellow, and then reddish, becoming resinous. It is easily characterized by instantly striking a deep violet blue by contact with chlorinated lime or other hypochlorites. It exerts no poisonous action on dogs. Eight grains introduced with a drachm and a half of water into the stomach of a rabbit caused strong clonic cramps, then labo.

rious breathing, loss of strength, dilated pupils, and inflammation of the mucous membrane of the mouth. Dropped into the eye it does not dilate the pupil. (Hoffman in Gmelin's Handbook, vol. xi. p. 249.)

*Preparation of Sulphate of Anilin.*—Having obtained anilin by the foregoing or any other process, the sulphate is easily prepared by several processes.

Take of Anilin, as pure as possible, 500 grains.

Sulphuric acid, 250 “

Distilled water, 4 fluid ounces.

Mix the acid with the water, add the anilin and agitate them together until a thick magma is formed and the odor of anilin has nearly disappeared. This is now washed with strong alcohol until free acid and coloring matter is removed; then, having pressed the drained salt between the folds of white filtering paper, it is dried in the dark. If wanted in crystals, the white pulverulent sulphate thus obtained is dissolved in boiling alcohol, which is allowed to cool slowly in a covered vessel in a dark place; the crystals, when formed, should be drained on filtering paper and dried in the dark.

The sulphate may also be made by dissolving the anilin in two fluid ounces of alcohol, 95 per cent., then having mixed the sulphuric acid slowly with two fluid ounces of the same liquid, when cool add it to the solution of anilin. The sulphate thus formed is washed with cold, strong alcohol, pressed in bibulous paper, and dried in the dark.

Sulphate of anilin is an odorless, colorless crystalline salt when entirely pure, but when exposed to air and light, especially if moist, it changes color from the formation of fuscine, the odor of anilin being also apparent. The crystals may be dried at  $212^{\circ}$  without decomposition except a slight change of color, but at a higher temperature they lose first water and then anilin, and an acid salt remains, which on being yet further heated is decomposed, producing sulphite of anilin, ammonia and odorin, with a residue of carbonaceous matter. When a grain of the sulphate is put in 14 grains of water in a test tube, and repeatedly shaken for an hour, a slight residue remains undissolved, indicating that water at  $60^{\circ}$  dissolves about 6 per cent. Absolute alcohol, cold, dissolves it but slightly, but at

the boiling temperature quite freely. Diluted alcohol is a better solvent; ether does not dissolve it at all. Water saturated at 212° solidifies on cooling. Its formula is  $C_{12}NH_8O, SO_3+HO$ .

Dr. Genth, of Philadelphia, who has recently turned his attention to the preparation of the anilin dyes, showed me a fine sample of the pure sulphate, which, if a demand should occur, can be furnished at three dollars an ounce, wholesale, at the Laboratory of Messrs. Andreykovicz and Poizat, 112 Arch street, Philadelphia.

## ON SYRUP OF IODIDE OF IRON.

BY DR. W. H. PILE.

To the Editor of the American Journal of Pharmacy.

*Dear Sir,*—The sample of Liquor Ferri Iodidi I send with this note, has been exposed to the air in a wide-mouthed vial for several weeks, with no other apparent change than an increased density, arising from loss of water by evaporation.

As I had previously been unable to prevent this article, as made by the usual formula, from losing its fine green color and becoming brown, when opened and exposed for even a very short time, I give you the method of its preparation, that you may judge whether the heat employed would be objectionable in any point of view.

R. Iodine	℥ij.
Iron filings	℥j.
Sugar	℥xvi.
Water	q. s.

Mix the iodine with four ounces of distilled water in a porcelain vessel, and gradually add the iron, stirring constantly, and avoiding much increase of temperature. When the liquid acquires a light greenish color, filter it into a boiling syrup made from the 16 ounces of sugar with 6 ounces of distilled water. When the solution has all passed, pour two ounces more distilled water gradually upon the filter; continue the boiling a few minutes longer, and lastly, when cold, add distilled water until the whole measures 20 fluid ounces.

NOTE BY THE EDITOR. The formula suggested by Dr. Pile is like that adopted in the Pharmacopoeia of 1860, which is nearly as follows:

Take of Iodine	two troy ounces,
Iron filings	one " "
Simple syrup	sixteen fluid ounces, or q. s.
Distilled water	a sufficient quantity.

Mix the iodine with three fluid ounces of water in a glass flask, and gradually add the iron filings, with agitation, and shake until all the iodine has combined. Place the syrup in a capsule, heat it to the boiling point, and filter into it the concentrated solution of iodide of iron, then having washed the filter with a little boiling distilled water, complete the measure of 20 fluid ounces if necessary with simple syrup and mix.

### ON ANEMONE LUDOVICIANA.

By ADOLPH W. MILLER.

(An Inaugural Essay presented to the Philadelphia College of Pharmacy.)

*Polyandria Polygynia*, Linnæus.

*Ranunculaceæ*, Jussieu.

Scape 1-flowered, involucrate, involucre softly lanuginous, subulately divided; leaves digitate, multifid, upper surface smooth, segments entire, linear, acute; petals 6, oblong-ovate, erect.—*Nuttall*.

The above plant, which Nuttall states to be found near the confluence of the Missouri and Platte rivers, and thence west to the Rocky Mountains, is also met with in considerable abundance in the State of Minnesota, especially on the dry, sandy bluffs forming the bed of the Mississippi.

The large, cup-shaped flowers are of a pale, purple hue, and appear before the leaves almost immediately after the melting of the snow has shown that the long and dreary winter of the North is approaching its close. Hence these blossoms are eagerly sought for as the first offerings of the long desired spring.

The many points of similitude between this plant and the European *Anemone Pulsatilla*, which were also noticed by Nuttall, very naturally gave origin to the supposition, that in chemical composition, and therapeutical effects they were also closely allied, if not synonymous. Numerous experiments, instituted by Dr. W. H. Miller, of St. Paul, Minnesota, with a view of verifying the latter surmise, proved to be entirely successful, and also served to establish the value of this remedy in



many chronic diseases of the eye, particularly cataract, amaurosis and opacity of the cornea. Very decided advantage was also experienced from its employment in cutaneous eruptions, and in secondary syphilis. These results, in conjunction with the investigation of its chemical constituents, are believed to be sufficient to warrant the substitution of this indigenous plant for the European *Anemone pulsatilla*, which, though not often administered by regular practitioners, is very frequently resorted to by the Homœopathists.

A tea of the dried flowers and herb was sometimes employed, as well as the juice of the fresh plant bruised and expressed, and then either preserved by the addition of one-fourth of its bulk of alcohol, or evaporated to the consistence of an extract. In preparing the latter, the presence of some volatile acrid principle was clearly manifested by the highly irritating vapors arising from the juice on the application of a gentle heat, producing a very painful impression on the eyes of the operator. That this volatile substance is also dissipated by drying is proved by the taste of the dry flowers, which is simply sweetish and herbaceous, that of the leaves being more astringent with very slight acrimony, while in the recent state both are exceedingly irritating and acrid. The odor of the dried plant is rather faint, being very slightly camphoraceous.

As the preserved juice had not been subjected to the deteriorating influence of evaporation, it was supposed to contain the greatest amount of active principle. It was therefore most frequently administered, and the most marked effects of the drug were observed to follow from its use.

A portion of this, which had been prepared during the previous year, was first examined in lieu of the fresh plant, which it was not possible to obtain in the vicinity of this city. By standing, the juice had been separated into a clear, dark brown liquid, and an earth-like deposit, occupying about  $\frac{1}{4}$  of the whole bulk. After having been well shaken, two ounces were mixed with four ounces of 95 per cent alcohol, and set at rest for two days. The mixture was then filtered, and the filtrate allowed to evaporate slowly to a small bulk of reddish brown syrup, soluble without residue in two drachms of distilled water. Even the smallest quantity gave a very decided indication of grape

sugar, with liquor potassæ and sulphate of copper. Sesquichloride of iron produced the deep greenish black color characteristic of tannic acid. A small proportion of gallic acid was also ascertained to be present.

The residue which had been left on the filter was removed and triturated with ether, thrown on a filter and washed with ether. The evaporation of this ethereal solution yielded a very small amount of oily resinous matter, which did not leave a greasy stain on heated paper, but rather made the spot more brittle and rougher than it was previously.

The portion insoluble in alcohol and ether was then treated with water, forming a dark brown solution, which was evaporated to a syrupy consistence having a black color. This gave yellowish brown precipitates with acetate and subacetate of lead, but none with subacetate after the action of neutral acetate. It was evaporated to three grains of a dark brown, brittle, shining, extractive matter, insoluble in hot alcohol, and but partially soluble in water.

Experiments were next made upon the dry flowers, and the seeds which happened to have been gathered with them. By a comparison of weights in the recent and in the dried state, it was found that by exsiccation 1000 parts had become reduced to 114.29, showing a loss of about 85 per cent. They were divided as finely as possible by a cutting knife, their villous and lanuginous character precluding other modes of comminution. 1000 grains were then digested with 7 ounces of 95 per cent alcohol, expressed after four hours, and twice consecutively subjected to the same process. The tincture gave with sesquichloride of iron, a greenish black color; with solution of sulphate of quinia, a white precipitate; with solution of gelatin, a dense, white, flocculent deposit, indicative of tannic acid. Boiled with sulphate of copper and liquor potassæ, a large amount of suboxide of copper was thrown down by the grape sugar present. The mixed alcoholic tinctures on evaporation left a greenish brown resin weighing 110 grains, and a small amount of light green wax-like matter clinging to the sides of the vessel.

As the resin did not appear to be strictly homogeneous, it was washed with successive portions of ether as long as any color was communicated to that solvent; by this operation all the

waxy matter was removed, and obtained separately on the evaporation of its ethereal solution. The resin insoluble in ether was of a firm consistence, dark brown color, weighing 104 grains.

After the flowers had been treated with alcohol for the third time, they were dried, and found to weigh 870 grains, having lost 18 per cent of alcoholic extract. They were then covered with water and digested in a steam bath for two hours. The expressed liquid gave dense precipitates with acetate and subacetate of lead used successively, thereby showing the presence of gum and allied bodies.

120 grains of the flowers finely cut up were then arranged in a percolator and exhausted with ether. After the menstruum had evaporated spontaneously, there was left a greenish resinous fluid. On the application of heat this separated into a hard resin, disposed to cohere and form small lumps, which could easily be removed mechanically, and a small amount of fluid, light colored, translucent, oily matter, possessing a very acrid and almost caustic taste. This was volatilized at a more elevated temperature, producing a very irritating pungent vapor, affecting the eyes and causing sneezing. The hard resin was also possessed of a peculiar taste, though it differed essentially from that of the other; it was found to be insoluble in strong alcohol.

The flowers, after being treated with ether, were displaced with strong alcohol, as long as any color was imparted to the menstruum. The evaporation of this liquid yielded a resin insoluble in ether, analogous to that which had been obtained from the first lot of flowers, besides several drops of a brown, ropy solution, which, judging from its taste, appeared to contain, simply grape sugar.

When the same flowers, already extracted by ether and alcohol, were exhausted with cold water, and this evaporated, a brittle, brown extractive matter was procured, having but little taste and odor. The residue of these operations was treated with strong sulphuric acid, being completely charred and made miscible with water.

An alcoholic extract prepared from a fresh portion of the flowers according to the directions of several of the Pharmaco-

poëias of Germany, had a sweetish, astringent taste and a reddish brown color, very closely resembling in all its physical properties a specimen of the genuine European *Extractum Pulsatillæ*, obtained from Mr. F. L. John.

An aqueous extract presented nearly the same appearance, but differed in consistence, being much softer, and also in taste, evidently containing a large proportion of grape sugar.

An examination of the dry leaves was then instituted. A cold infusion was prepared by macerating 250 grains in 6 ounces of water for twenty hours, and expressing. It was of a clear, reddish-brown color, herbaceous taste and odor. After standing for a short time, a precipitate appeared, which was removed by filtration. Grape sugar and tannic acid were easily detected, but no traces of vegetable albumen could be found. Acetate of lead threw down much gummy matter.

The same leaves were subsequently digested with a hot solution of carbonate of soda and strained. A light-colored, yellowish gelatinous mass was precipitated from this by dilute sulphuric acid. On cooling, the liquid itself was observed to gelatinize, showing the presence of some compound of the pectin series.

Two thousand grains of the bruised leaves of *Anemone ludoviciana* were placed in the still of a Beindorff's apparatus, and steam was passed through them, until three pints of distilled liquid had been condensed. This became slightly opalescent on standing, depositing on the sides of the vessel a very thin film of camphoraceous matter. It had an acid reaction on litmus paper, but not in any very marked degree.

Another portion of one thousand grains of the leaves was then placed in the still after the former contents had been removed, and was subjected to cohobation with the liquid previously obtained. The properties of this distillate were analogous to those of the first, but recognized more readily. The peculiar taste and camphoraceous odor were very perceptible, the acid reaction on litmus paper stronger. A very thin iridescent film was observed floating on the surface.

The liquid was then placed in an air-tight vessel, and suffered to remain at rest for twenty days in a cool cellar. At the expiration of this time, traces of a whitish deposit were observed,

but in so minute a quantity that they could not be separated by mechanical means. The distillate was therefore strongly agitated with half a fluidounce of chloroform and this separated. The chloroform was rapidly evaporated in a current of dry air, and yielded a trifling amount of a whitish substance. This had a peculiar, very acrid taste and a well marked camphoraceous odor; it was volatile at ordinary temperatures.

It was believed that this substance was nearly pure anemonin, and that the acid reaction of the distillate was due to anemonic acid, both of which could doubtless be obtained in much greater amount from the green plant. This conclusion seemed the more probable and justifiable when the abundance of acrid and irritating vapors was taken into consideration, which were given off in evaporating the juice of the fresh herb to an extract, this having been prepared by the writer in former years with great personal inconvenience on that account. The European authorities also agree in the statement, that they were unable to isolate anemonin from the dry herbs of *Anemone pratensis* and *nigricans*. This agrees very nearly with the results obtained by the distillation of the dry leaves of *Anemone ludoviciana*, mere traces of the active volatile principle, yet enough to demonstrate its existence.

The alcoholic extract of the leaves, of which ten drachms were obtained from six ounces with the application of heat, or about twenty per cent, presented a shining deep green color, showing the amount of chlorophylle contained in the herb. The odor of this extract was herbaceous, the taste peculiar, astringent and disagreeable.

*Inorganic Constituents.*—Six ounces of the leaves having been extracted with boiling alcohol, were incinerated in an open vessel. A light-colored ash resulted, which was found to weigh 162 grains. This was lixiviated with boiling water and filtered. The lye gave a white precipitate with nitrate of silver, which was entirely soluble in liquor ammoniæ, showing the presence of a chloride. A white precipitate was also produced by chloride of barium, not wholly soluble in nitric acid, indicating a sulphate.

When a concentrated solution of tartaric acid was added to the alkaline liquid, carbonic acid was liberated with efferves-

cence, and the mixture after being agitated and set at rest, deposited white crystals of bitartrate of potassa. Since no trace of yellow color could be detected in the flame of the blow-pipe when directed on the salts remaining after the expulsion of water from the lye, but only a delicate purple tinge, the presence of potassium was inferred in the following combinations: sulphate and carbonate of potassa, and chloride of potassium.

After the lye had been oxidized with nitric acid, a blue color was produced on the addition of ferrocyanide of potassium, while previous to oxidation the blue color was not formed immediately with that test, proving the existence of a protosalt of iron.

The insoluble portion of the ash was treated with dilute nitric acid, much carbonic acid being evolved. The filtered solution gave a dense white precipitate with binoxalate of ammonia, indicative of carbonate of lime. Magnesia was detected by white gelatinous precipitates with liquor potassæ, liquor ammoniæ and carb. of potassa.

## PHARMACEUTICAL NOTES.

By JAMES T. SHINN.

*Acetate of Potassa.*—On account of the deliquescence of this salt, it is difficult to keep in the dry state, and as it is usually prescribed in liquid form, I have found it very convenient to have on hand a solution of definite strength. The crystallized salt consists of acetic acid 51, potassa 47.2, water 18, so that for every 116.2 parts of acetate we require 47.2 of potassa, or 69.2 of carbonate, the latter being the cheapest form for use. For 8 ounces of acetate of potassa we decompose (116.2 : 69.2 :: 8 : 4.76)  $4\frac{1}{2}$  ounces of carbonate of potassa or salt of tartar, with sufficient acetic acid. Every one hundred grains of officinal acid s. g. 1.041 requires sixty grains bicarbonate of potassa, or (100.2 : 69.2 :: 60 : 41.43) 41.43 grains of the carbonate to neutralize it, so that  $4\frac{1}{2}$  ounces of carbonate of potassa need about (41.43 : 100 :: 4.75 : 11.46) eleven and a half ounces by weight of the U. S. P. acid. Therefore to make a solution containing one-half acetate of potassa,

Take of Carbonate of potassa	4 ounces 6 drachms,
Acetic acid	$11\frac{1}{2}$ ounces or sufficient.

Add the acid gradually to the carbonate of potassa until effervescence ceases, and the liquid is neutral to test paper; add water enough to make a pint of solution, and filter. The commercial acid is generally a little stronger than the officinal,\* ranging up to 1.044, consequently less than eleven ounces and a half will be required.

This solution keeps a long time unchanged, and every fluid drachm containing half a drachm of acetate potassa, is very readily *weighed by measure*, and answers for most prescriptions calling for the salt in solution. Every apothecary can make it himself with but little trouble, and at one-third the cost of the dry article; if the latter is needed, a small portion may be quickly evaporated in a porcelain capsule on a water-bath.

*Compound Infusion of Gentian.*—This infusion is frequently ordered by physicians in Philadelphia, and when made officinally, spoils too soon to keep on hand in quantity, while to prepare it whenever prescribed, often takes longer than is convenient, even if the immediate percolation process of Grahame is employed. A concentrated tincture, which will remain unchanged, containing such a proportion of alcohol, that when diluted with the requisite quantity of water, the mixture will agree with the formula of the Pharmacopœia, obviates the difficulty completely. Such a one is made as follows :

Take of Gentian, in powder, two ounces,  
Orange peel, “  
Coriander, “ each half an ounce.  
Diluted alcohol, sufficient.

Make a pint of tincture by percolation. For compound infusion of gentian, add four fluid ounces of this tincture to twelve fluid ounces of water. Thus made, it contains the proper proportion of alcohol, and is of officinal strength in gentian, orange peel and coriander, and may possibly be more effectual on account of the stronger menstruum used, while the dispenser does not detain the patient, nor have to send the medicine by his own messenger.

\* The true sp. gr. of the U. S. P. Acetic Acid, according to Mr. Maisch is 1.046 and this number has been adopted for the U. S. P., 1860.—  
EDITOR.

REMARKS ON THE ACTIVE PRINCIPLES OF HYDRASTIS  
CANADENSIS.

(In a letter from WM. S. MERRILL & Co., of Cincinnati, to a member of the Publishing Committee, with permission to publish.)

We have delayed further reports to you on the proximate principles of the *Hydrastis*, until we could examine the subject a little further. We now report the result of our observations as follows: The *Hydrastis* contains two distinct alkaloids which we name *hydrastia* and *hydrastina*. The former, in its uncombined state, is very soluble, and we have not obtained it in crystalline form, but it forms beautiful yellow salts with all the acids. Of these the muriate is the least soluble and most easily obtained in beautiful feathery crystals. It is the substance which, dried and powdered, we have been selling as *hydrastine*. The sulphate is scarcely distinguishable from the muriate in appearances, and in medicine has the advantage of being more soluble in water, but for this reason is more difficultly prepared.

The *hydrastia* closely resembles *berberina*, the alkaline base of *Berberis vulgaris*, and also we think that of *Xanthorrhiza apiifolia*, and has been pronounced identical with it, but after a careful comparison we do not think it is so. With the purest specimens of the muriate of each which we could make, we found the behaviour with several reagents to be distinctly different. These comparative experiments we will report another time if desirable, but will not take time and space for it now.

The other base, *hydrastina*, when pure, is very insoluble in water, so much so that it is almost wholly tasteless. It is soluble in hot alcohol, and from that solution crystallizes in large greenish crystals, as sample sent you. It combines readily with acids, and neutralizes them, forming intensely bitter salts. These are not easily crystallized, but when dry form white amorphous powders which we have no doubt are active medicinal agents.

Some of our physicians anticipate that the pure *hydrastina* will prove a convenient tonic for children and fastidious patients, as, taken in aqueous fluids, it is quite tasteless, but will become active when combined with acids in the stomach.

The acid with which these bases are combined in their normal



state we have not obtained quite pure, and have not determined whether it is identical with any of the already known vegetable acids or not.

*Cincinnati, May 3d, 1862.*

REMARKS BY THE EDITOR AMER. JOUR. PHARM.: The reader's attention is directed to an Inaugural Essay, by Mr. Alfred B. Durand, at page 112, vol. xxiii. April, 1851, of this Journal: to another by Dr. Mahla, page 141, March, 1862, and a third in this number, page 360, by J. Dyson Perrins, F.C.S. of England, all on *Hydrastis Canadensis*, the last of which originally appeared in an abridged form in the *Chemical News*, (London) April 12th, but as a full paper in May, 1862, in the *Pharmaceutical Journal* of London. We are thus particular in noticing these papers—1st, to show that the two first must have been well known to Mr. Merrill, who, in speaking of the subject, makes no allusion to them, and reports the result of his observations to be that “*hydrastis* contains two distinct alkaloids which he names *hydrastia* and *hydrastina*.” This sort of assumption is to be discountenanced. Mr. Durand, eleven years ago, made out the alkaline nature of *hydrastia* sufficiently clear; yet so modest was he, that fearing his results might not be entirely satisfactory, he says, “For the present I shall therefore call the substance *hydrastin*, with the hope that I will be more successful, after repeating my experiments on a larger scale, in fully establishing its rank among the alkaloids, and in conformity with our nomenclature change its present name of *hydrastin* to that of *hydrastia*.” Mr. Durand's doubts of the true alkaline nature of *hydrastia* were that he could not obtain *crystallizable salts*, and both Mr. Perrins and Mr. Merrill agree in stating that its salts do not crystallize. Mr. Merrill says that his *hydrastia* [the *hydrastin* of the *Eclectics*] closely resembles *berberina*, the alkaline base of *Berberis vulgaris*, and also, he thinks, that of *Xanthorrhiza apiifolia*, and has been pronounced identical with it, “but after a careful comparison we do not think so,” &c. In relation to this sentence we wish to remark, that no published intimation of the analogy or identity of *hydrastin* and *berberina* appeared (so far as our knowledge extends) prior to Dr. Mahla's announcement of the fact in *Silliman's Journal* for January, 1862. Dr. Mahla bases his opinion on an ultimate analysis—and J. Dyson Perrins corroborates his opinion. If, therefore, Mr. Merrill has just reason to doubt the correctness of Dr. Mahla and Mr. Perrins, as he says, it is but just that he should publish his experiments. If Mr. Merrill held this opinion prior to January, 1862, it is to be regretted that he did not make it known. On the other hand, it gives us pleasure to call attention to the fact that Mr. Merrill's manuscript is dated at Cincinnati, May 3d, 1862, just nineteen days after the notice of Mr. Perrins' paper in the *Chemical News*, and only three days after its full publication in the *Pharmaceutical Journal*, and hence that his opinion in regard to the analogy of

hydrastin (berberin) with the alkaloid in *Xanthorrhiza apiifolia* was probably formed prior to Mr. Perrins' announcement of that fact, although Mr. Perrins has a just claim to its discovery.

It may be asked why did not Durand notice the substance since called hydrastin by the Eclectics, which Dr. Mahla proves to be muriate of berberina? In referring to his paper it will be found that Mr. Durand considered it to be "yellow coloring matter," as when bichloride of tin was added to the alcoholic tincture, it produced "a most brilliant yellow precipitate," which was most probably muriate of berberin, with subchloride of tin. We have in possession a phial presented to us by Mr. Durand in 1851, labelled "hydrastin,"—well crystallized, of a straw yellow color; and another specimen made and presented by Mr. Edward S. Wayne, of Cincinnati, in 1856, identical in appearance and character with it, except that it is lighter in color. Last spring we examined a very beautiful crystallized specimen of Durand's hydrastia, made by Mr. Wm. S. Merrill, of Cincinnati, but which was darker colored than either Durand's or Wayne's, which may have been due to the larger size of the crystals. In conclusion we will remark, that the well defined chemical characters of the peculiar alkaloid of hydrastis, the bitterness of its salts, and the great esteem in which the plant is held by Eclectic practitioners, all point to the propriety of our physicians submitting this alkaloid to a therapeutical examination to ascertain its real merit in an isolated form. If, as Mr. Merrill suggests, its tonic power is of a kind appropriate for children, the tasteless character of the pure alkaloid, as he remarks, may be favorably seized on as a form suitable for its exhibition.

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### ON BAPTISIA TINCTORIA.

BY BENNETT L. SMEDLEY.

(*An Inaugural Essay.*)

Wild indigo is a small perennial shrub found in all parts of the United States, growing generally in woods and dry barren soil.

The root is externally of a dark brown color: internally lightish yellow, containing a small ligneous cord, rendering it very difficult to pulverize. The stem is from two to four feet in height, much branched, and bearing a small yellow flower, and is characterized by turning of a blue color on being dried. The fruit is an oblong pod of a bluish black color.

On the application of heat to a slightly alkaline infusion of the root, I detected the presence of albumen, the existence of which was also indicated by a turbid appearance being produced

by the addition of nitric acid, and by a copious precipitate being thrown down with a solution of corrosive sublimate, after being slightly acidulated with acetic acid.

By boiling the infusion and filtering to remove the albumen, I obtained a precipitate by adding a solution of the basic acetate of lead, indicating the presence of gum.

The tincture of iodine was added to the decoction of the root, turning it of a deep blue color, which was dissipated by boiling a sufficient length of time, proving the presence of starch.

The addition of a solution of the persulphate of iron to a strong infusion, failed to detect either tannic or gallic acid. The presence of tannic acid was neither indicated by a solution of gelatin, nor by sulphate of quinia.

To a concentrated tincture made with strong alcohol, a large quantity of water was added; a yellowish resin was thrown down, two drachms and two scruples being obtained from two pounds of the root.

A quantity of the root was boiled with water acidulated with muriatic acid, and the liquor strained; to this was added, slightly in excess, a diluted milk of lime, which caused a copious precipitate; this precipitate was collected, washed repeatedly with distilled water and dried; the dried precipitate was treated with boiling alcohol, and the filtered solution evaporated, leaving an extract of a light yellowish color; this was treated with hot water slightly acidulated with sulphuric acid, agitated with animal charcoal, filtered and set aside to crystallize. This liquid had the strong disagreeable taste of the root, and yielded perfectly transparent crystals in plates, similar to those of chlorate of potassa.

On adding a slight excess of solution of ammonia to this liquid, a white feathery precipitate was produced.\*

The root employed was some collected by myself, near Media,

\*The probability is great that the author has here isolated a new alkalioid, but so little interest has he manifested in the result of his investigations, that he gives us no clue to its character. He does not say whether it has an alkaline reaction, a bitter taste, or is destructible by heat. This careless, incomplete way of recording is greatly to be deprecated, and deprives those who adopt it of much of the credit otherwise due them.—  
ED. AM. JOURN. PHARM.

in this State, about the 1st of March, 1861, and was carefully prepared and dried.

I was unable to discover any fixed or volatile oil, the former by treating with ether, or the latter by distilling with an alkaline solution.

The above chemical examination was suggested by interrogations from an old country gentleman, who has for many years been administering both to his own family and neighbors a strong decoction of the root, as a most effectual cure in the early stages of dysentery.

Four grains of the resin, which by the Eclectics is styled baptisin, were taken by myself, attendant with no other effect than occasioning much nausea.

The medical properties of the root, I suppose to exist in the crystallizable principle obtained, and those ascribed by the Eclectics, to the resin, are mainly owing to its containing a very small portion of this principle in combination.

Phila'd. January 22d, 1862.

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#### REMARKS ON DIALYSIS.

By WILLIAM PROCTER, JR.

The important subject of liquid diffusion, as developed by Prof. Thomas Graham, was laid before the readers of this Journal in a paper published at page 518, for the year 1861. Since that time, both in England and on the Continent, the importance of the facts set forth by Mr. Graham have attracted much attention, and results of great interest to physiology, chemistry and pharmacy, seem destined to flow from them. In the April number of the Pharmaceutical Journal, page 515, Prof. T. Redwood has published an elaborate lecture, illustrated with several wood cuts, in which he has gone into much detail with tabular views of the relative diffusive power of different substances. The great length of this paper precludes its publication in this Journal, and whilst referring the reader to the original, it is proposed to give such a brief sketch of the subject as will enable those not conversant with the process to get an idea of its nature and usefulness.

*Liquid Diffusion* is the tendency which particles of matter in solution have to move from one part of a liquid menstruum to another, even in opposition to the force of gravity, under particular circumstances.

The first arrangement suggested by Mr. Graham consists in placing a small jar, containing a solution of the substance to be diffused, in a large jar of distilled water, so carefully that the fluids be not mixed mechanically, when, on standing, the dissolved body will be found to have diffused itself into the distilled water. Whilst muriatic acid, common salt, cane sugar, and many other bodies possess this property in a strong degree, others, such as albumen, gum, etc., are found to enjoy it but slightly. Now Mr. Graham discovered that, as a general rule, crystallized bodies diffuse much more readily than amorphous substances, and hence he has called the former *Crystalloids*, and the latter *Colloids*, from *collin*, the best sort of gelatin. (See Mr. Graham's paper.)

Of the bodies heretofore tested, hydrochloric acid is the most diffusive; and assuming this body as unity, the times of equal diffusion for several substances are as follows: hydrochloric acid 1; chloride of sodium 2.38; sugar 7; sulphate of magnesia 7; albumen 49; caramel 98.

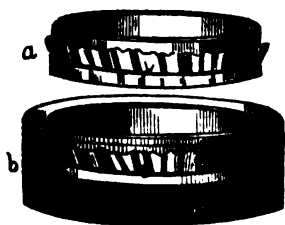
Mr. Graham considers crystallizable bodies to be in a *statical* condition, whilst the colloids are in a *dynamical* state; that is to say, the latter have a greater susceptibility to the influence of external agents, and from this cause are adapted to the transforming influences of the processes of organic life, like albumen, gelatin and fibrin of the animal body. These bodies generally form a feeble union with water, and the solid hydrates of some colloids possess a remarkable property in reference to the diffusion of other bodies. For instance, jelly of gelatin will permit crystalline matter in an aqueous solution in contact with it to diffuse or pass through or into it, whilst it will refuse a passage partially or wholly to a body of the colloid class. According to Prof. Redwood, if ten per cent of chloride of sodium be added to one part of such a jelly while rendered fluid by heat, and this having been put into the bottom of a diffusion jar, the latter be carefully filled up with seven parts of pure liquified jelly, after the first has solidified, and quickly cooled, the chloride of

sodium will, under the circumstances, diffuse out of the lower stratum into the upper, just as quickly as though the two strata were water and saline water.

Now if the lower stratum of jelly be mixed with ten per cent of vegetable extractive instead of the chloride of sodium, no diffusion will occur, that body from its colloidal nature not being able to traverse the gelatinous medium as did the salt.

Taking advantage of this fact, Mr. Graham found on trial that a very thin stratum of a gelatinous medium would prevent the diffusion of colloid bodies, and that by the use of such a septum or diaphragm, the process of separating the crystalloids from the colloids became greatly simplified. After a trial of various gelatinous tissues, parchment paper\* was found in all respects the best, although paper sized with starch jelly, or gelatin, or coagulated albumen, would answer.

When the process of diffusion is thus used as a means of separating bodies by the aid of a hydrated septum, the process is called by Mr. Graham *dialysis*, the instrument a *dialyser* and the solution of the matter which passes the septum the *diffusate*, just as we use the terms filtrate and percolate as substantives.



The form of dialyser recommended by Mr. Graham, consists of a short cylinder six to ten inches in diameter, and two inches high, made of a band of gutta percha. Over one end of this a sheet of parchment paper is stretched, and tightly tied by a string, the edges of the paper being crimped around the outside of the cylinder so as to extend some distance above the string as at *a* in the figure. This part of the apparatus which is to contain the substance to be diffused, is placed within a larger glass vessel, of similar shape, about six inches deep, and capable of holding five to ten times as much, as at *b*. Into this, distilled water is poured until three-fourths full, the smaller vessel floated on it, and the liquid to be diffused then

\* Parchment paper is made by simply passing ordinary white wrapping paper quickly through a cool mixture of two parts of sulphuric acid, and one of water by weight, and then washing it thoroughly till the acid is removed.

poured into the latter, when the process proceeds without further attention. In thus taking advantage of the principle of circulatory displacement, by putting the liquid to be diffused at the top instead of at the bottom of the water, the process is much facilitated, especially where the diffusible body is abundant.

Thus arranged, the apparatus is left for hours or days, according to circumstances, such as the rapidity of the process, or the tendency to decomposition by reason of the warmth of the weather or the dilution of the diffusate.

Prof. Redwood says: "It may be well to observe that parchment paper, or indeed any of the substances named above, can only be used as a septum in dialysing *aqueous* liquids. The septum is considered by Mr. Graham to owe its action to its condition, in the wetted state, as the hydrate of a colloidal substance, in which the water of hydration is held by a weak affinity, which the superior affinity exerted by a crystalloid can overcome. Hence there is dehydration taking place in one direction, and rehydration in the other direction, through the septum during its action. A septum suitable for dialysing alcoholic and ethereal solutions remains to be discovered. Some form of collodion may possibly answer the purpose."

The following results of dialysis by Mr. Graham are given in Prof. Redwood's lecture, viz:

<i>Dialysis.</i>		<i>Dialysis.</i>	
Twenty-four hours at 54° F. Two per cent. Solutions.	Relative. Diffusate.	Twenty-four hours at 50° to 60° F. Ten per cent. Solutions.	Relative. Diffusate.
Chloride of Sodium,	1.000	Gum Arabic,	.004
Picric Acid,	1.020	Starch Sugar,	.266
Ammonia,	.847	Cane Sugar,	.214
Thein,	.708	Milk Sugar,	.185
Salicin,	.503	Mannite,	.349
Cane Sugar,	.472	Glycerin,	.460
Amygdalin,	.311	Alcohol,	.676
Extract of Quercitron,	.184	Chloride of Sodium,	1.010
Extract of Logwood,	.168		
Catechu,	.159		
Extract of Cochineal,	.051		
Gallo-Tannic Acid,	.180		
Extract of Litmus,	.019		
Purified Caromel,	.005		

Prof. Redwood recommends a large-sized bladder glass, as

used in air pump experiments, in lieu of the gutta percha cylinder, attaching the parchment paper to the larger end. This he supports on a large-sized beaker glass, into which it enters just sufficiently to be half immersed in the water it contains. The liquid to be diffused is then poured in the small upper end, which may then be covered with a glass plate to keep out dust and prevent evaporation.

When the object is to get the diffusate as concentrated as possible, it is necessary to use a shallow vessel, as in the figure, and renew the water when the process is checked; but when the object is rather to exhaust the liquid above the septum of its diffusible matter without reference to the state of dilution of the diffusate, then a deep vessel is best. Prof. Redwood has invented a grooved plate by which a thin stream of water is made to take a spiral course around the outer surface of the parchment paper, from the circumference to the centre, so as to constantly renew the liquid in contact with the septum. There may be an advantage in certain cases arising out of this arrangement, yet the process of dialysis is necessarily so gradual that the simple arrangement of the figure will probably succeed in most instances.

It now remains to remark on the practical applications and uses of dialysis, as they have been thus far developed.

1st. As an agency in proximate analysis; affording a means of separating crystallizable and well defined bodies from amorphous matters, like extractive, gums, mucilages, the pectin-like substances, the tannins, oils, etc. For instance, if a vegetable extract containing an alkaloid or crystalline neutral bitter principle, be rubbed down with water to a uniform mixture and thrown on the dialyser, this active principle, together with all the soluble earthy matter will be found in the diffusate, whilst the inert ingredients will be retained. Mr. John Attfield (Pharm. Jour. March, 1862, p. 417) has applied this apparatus in an investigation of the mineral constituents of plants, especially as exhibited in the saline efflorescences on the vegetable extracts, so familiar to all apothecaries. Mr. Attfield also suggests its use for purifying crude lemon juice.

Mr. Graham has separated the crystallized ingredients of urine. Baron Liebig has isolated creatin from extract of meat;



and more recently he has demonstrated by its means the presence of *alloxan* in an animal secretion. (Pharm. Jour. 528, April, 1862.)

Mr. Büchner has shown (*ibid*, 572) that when a thick viscous mucilage of marshmallow root is put into the dialyser, over distilled water, after two days the whole of the asparagin of the root is in the first diffusate, and may be obtained in fine crystals by simple evaporation.

2d. Mr. Redwood suggests that dialysis offers the means of producing a new class of medicines, containing the active principle of plants, partially purified, and in the state of combination in which they exist in nature, and he is now engaged in applying the principle to opium and aloes in this view. The field opening in this direction is probably rich in future discovery, and merits the attention of investigators. The main difficulty is the very dilute condition of the solution and the slowness of the operation, and consequent tendency to spoil or ferment; but it may prove, owing to ferments being colloidal matter, that the diffusates may not be liable to change to a degree that will embarrass the operation.

3d. It affords an elegant means of separating crystalline poisons, like arsenious acid, tartar emetic, strychnia, morphia, etc., from the crude colloidal contents of the stomach and intestines, so that they may be at once detected unclogged by inert matter, and Mr. Redwood has "already obtained these substances by dialysis from the stomach, the flesh and the blood of animals that have been poisoned, distilled water alone being used for their extraction." The perfect simplicity of this method, uncomplicated by chemical agents liable to contain these poisons, will add greatly to the force of medico-legal testimony in future prosecutions.

4th. Dialysis, also, says Mr. Redwood, will enable us to explain satisfactorily many physiological and geological phenomena which have hitherto been involved in much obscurity. The stomach of an animal is a dialysing apparatus; in which the soluble food is dialysed, and the insoluble food digested under the influence of crystalloids supplied through the coats of the stomach by diffusion, an action closely resembling that which occurs when hydrated basic chlorides of colloidal oxides, like per-

oxide of iron and alumina, are placed on the dialyser, when free hydrochloric acid is diffused through the septum, while the hydrated oxide remains on the dialyser. It is also probable that the action of medicines when taken into the stomach is influenced by their relations as colloids or crystalloids, some being transfused through the coats of that organ, whilst others exert their influence along the whole alimentary canal.

5th. Lastly, it is believed that the study of the phenomena connected with the diffusion of liquids, will have an important bearing on our knowledge of the real condition of matter, and perhaps throw some light on molecular motion as a source of electricity, heat, and other imponderable influences, thus rendering its investigation worthy alike of the philosopher and the chemist.

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#### PHARMACEUTICAL GLEANINGS AND NOTICES.

By THE EDITOR.

*On Coating Pills.*—Mr. Barnard S. Proctor, of New Castle on Tyne, England, has published a long list of experiments on the relative merits of processes for coating pills, which have obtained in England, some of which appear to be highly objectionable. In the anxiety to render pills tasteless, it is but too apparent that pharmacutists are tempted to overlook the effect of the coating to retard their action as medicines. The author gives forty-five distinct modifications of the process, among which the following liquids are employed to moisten the pills, and the following powders to roll them in afterwards:

Albumen, or white of eggs; water; simple syrup; mucilage of gum arabic; Canada balsam, diluted with two parts of alcohol; melted white wax; tincture of shellac; collodion; solution of gelatin; alcohol and syrup, equal parts; tincture of tolu; tincture of sandarach, and tincture of resin.

The powders employed are tragacanth; tragacanth and sugar, equal parts; powdered French chalk; lycopodium; powdered sugar; magnesia; silver leaf; resin and French chalk, equal parts, and shellac and pumice stone powder, made by rubbing shellac and pumice with water to a creamy consistence, and drying the powder. These materials were employed in

various ways to coat pills in the forty-five experiments, and a record retained of their condition after two months keeping in a dry place, and then of the effect produced by transfer to a damp cellar, by dipping in cold water, and of the length of time warm water at 90° required to soften and dissolve the core. The last form of trial was with but a limited number.

The author in summing up his conclusions says: "These experiments show that the oft-repeated story about silvered pills being difficult of solution, must be looked upon as a popular error. The reason why pills occasionally pass through the stomach undigested, must be sought for either in the state of the patient, or the composition of the pill, rather than to the nature of its coating; for even the dipping in lac varnish did not protect the pill formore than an hour, whilst in the stomach heat and moisture are assisted by chemical and mechanical means." "Most of the formulæ yield coatings which are effectual in covering the taste of the pills for a sufficient time. As far as my experiments have gone, none of the coatings cover the odor of pills of assafœtida, camphor, &c."

Of the various processes, the easiest are those in which the pills are first rolled in water or varnish, and then in a powder; viscid fluids like albumen and mucilage are more troublesome. The author prefers a mixture of spirit and water for aqueous, and lac varnish for resinous liquids. Of the powders, magnesia, lycopodium and sugar are apt to become clotty; sugar gives a granular, rasp-like surface; French chalk readily produces a smooth uniform coat with many of the fluids, but is improved by the addition of resin when the liquid used is alcoholic; tragacanth is apt to produce a rough granular coating. The author, who esteems the power of resisting moisture a very important condition of success, says the disadvantage of using coatings soluble in water will be seen by the readiness with which many of the pills become adhesive when exposed in a damp situation. The addition of sugar to tragacanth increases its tendency to soften. He also finds Mr. Furley's coating (albumen with tragacanth and sugar) to become speedily clammy in certain cases, as where pills contain muriate of ammonia or glycerin. The author concludes with the following paragraph: Probably the

choice of a process will depend, in some measure, upon the composition of the pills, and other circumstances which it is difficult to foresee. The processes, No. 29 (rolling in tincture of lac, and in equal parts of resin and French chalk powders,) and No. 45, (rolling in a mixed tincture of 3ss. of lac and ʒi. of resin in fʒiiss. of spirit, and then in a mixture of three parts French chalk and one part resin,) are those which appear to promise the most general utility. The proportion between the quantity of the tincture and the number of the pills considerably influences the quality of the coat. For dispensing purposes it is convenient to use a two or three ounce pomatum pot, into which the tincture is dropped in about the proportions of four or five minims to a dozen pills, diminishing the quantity for large numbers, then putting in the pills, and shaking them till uniformly covered, after which they may be immediately thrown into a tray sufficiently large to allow of their rolling freely; when covered with the powder, they may be at once transferred to the box, but when occasion permits, it is advantageous that a few minutes be allowed for the hardening of the varnish.

*Vesicating Collodion.*—Mr. Charles R. C. Tichborne, in the London Pharmaceutical Journal for April, 1862, discusses the subject of vesicating collodion, and offers a formula which he considers effective and worthy of adoption, as uniform and reliable in its action. The author remarks on the variable character of vesicating collodion as dispensed in London, owing to the fact that pharmacutists have private formulæ differing from each other. Mr. T. thinks, in this preparation, the collodion should be associated with some substance like acetic acid, that will render it permeable by the active principle, which he esteems is not the case with collodion, basing his arguments on the conditions presented by a film of simple collodion on glass, which he examines. Now it is probable that vesicating collodion has been more used in the United States than elsewhere, mainly owing to the lower price of the vehicle; and the experience of American Pharmacutists shows, that, if well made, the quantity of fixed oil which is withdrawn from the

cantharides is sufficient not only to prevent, in great measure, the contractile force of the film, but to so alter its consistence as to meet the conditions required by Mr. Tichborne. We will first give his remarks and formula, and then state in outline that adopted in the forthcoming United States Pharmacopœia. "First, then, let us examine the texture of a collodion film, to mark its applicability in the present case. If we pour upon a glass slide some recently prepared collodion, and then examine it by the microscope, it will present the following appearance:—a pretty homogeneous and smooth ground, but running through which are slight ridges, which produce large honeycomb markings. These ridges are caused by the quick evaporation of the ether; the whole is interspersed with filaments of partially disorganized cotton in a semi-gelatinous state. However carefully the cotton is prepared, it is next to impossible to get rid of these fibres, some portion always escaping the perfect action of the acids. If we can add a small quantity of glacial acetic acid to the collodion, we shall find the character of the film greatly changed. From the slower evaporation, the honeycomb ridges are no longer palpable, whilst the solubility is so much increased that the filaments are found to have disappeared. This film is perfectly uniform, but it presents this peculiarity, that it gradually dries into a mass of jelly-like globules, which, however, possess but little cohesion; when dry, it is very short, for if the finger be run up the glass, instead of leaving it as a tough skin, it collects as a moist crumbled mass. Having so far seen that the glacial acid, besides destroying the contractility, gives it the properties of porosity and slowness in drying, it follows that such a collodion is particularly suited for the application of any vesicant which we may intend to apply, instead of being a varnish which hermetically seals up the active matters. Glacial acetic acid is one of the best direct solvents of cantharidin with which we are acquainted. Pure cantharidin was found to be very soluble in that acid, a saturated solution depositing it unchanged on evaporation in hard mica-like crystals. The principle, then, we propose is, to exhaust cantharides by a mixture of ether and acetic acid, and to convert these into collodion by the addition of gun cotton.

Take of Cantharides six ounces.

Ether from methylated spirits, 18 fluidounces, or q. s.

Glacial acetic acid, two fluidounces.

Gun cotton, half an ounce.

\*Methylated spirit of wine, seven fluidounces, or q. s.

The cantharides, coarsely powdered, are placed loosely in a displacement apparatus, the flow of which can be regulated by a tap; upon this is poured the ether and acetic acid previously mixed together; after the whole has passed through, it will be found that the *debris* has retained by absorption seven fluidounces, which must be displaced by the gradual addition of an equal bulk of methylated spirits. If properly done there is not the least danger of the admixture of the spirits with the percolated menstruum, as the animal substance of the flies swells considerably under the prolonged influence of the spirits, so that the same bulk will be insufficient to quite displace the ether. The ethereal solution should then be made to measure exactly 15 fluidounces by the addition of a little spirit, and may then be converted into collodion by the addition of the gun cotton."

Mr. Tichborne, after asserting that the *Mylabris cichorii* may be substituted for the cantharides, (a fact well known to us here,) gives the following method of applying his collodion :

"The part upon which the vesicle is to be raised should be painted with the vesicant to the desired extent, bearing in mind that the blister produced always extends to about one-tenth of an inch beyond the margin of the space covered by the collodion. Care should also be taken that there is a considerable thickness of collodion upon the surface. To ensure this, the brush should be passed over and over again until about half a drachm has been used to the square inch, or less when operating on a tender epidermis. It is desirable to cover the surface with a piece of oiled silk or sheet gutta percha, as it hastens the action of the collodion.

In ten minutes, or a quarter of an hour if the cuticle is hard,

\* Methylated spirits is common alcohol mixed with a certain portion of wood spirit or methylic alcohol to prevent its internal use, and in which condition the excise duty is greatly reduced with a view to its use in manufacturing.

the collodion should be wiped off with a little cotton wool moistened with ether, when the blister will almost instantly rise."

In comparing the collodion of Mr. Tichborne with that in common use in the United States, almost the only difference is in the presence of acetic acid. Now, there can be but little doubt that the acetic acid in this preparation has a caustic action of its own, independent of the cantharidin, and it may facilitate the action of the cantharides; yet as to the necessity of this aid, or of that other influence it exerts on the consistence of the collodion, there is abundant reason to doubt, unless it be required to effect the vesicoation in the shortest possible time. From Mr. T.'s statement of the time required, we believe his vesicant is quicker in its action than that in use here, but in no other respect does it appear to us improved, whilst the cost is increased. We would also suggest that it is a mistake to use the cantharides in *coarse* powder, and that the quantity of menstruum used by Mr. T. is insufficient to thoroughly exhaust the flies. With these remarks we will offer the recipe which was provisionally adopted by the revising Committee of the U. S. Pharmacopœia.

Take of Cantharides, in fine powder, eight ounces.

Cotton, prepared as for collodion, [gun cotton] 100 grs.

Ether, a sufficient quantity.

Pack the cantharides firmly in a percolator, cover it with muslin and pour on ether until fourteen fluid ounces have slowly passed. Dissolve the gun cotton in this liquid, set it aside, and continue the percolation until eight fluidounces more of the ethereal liquid is displaced, which is to be evaporated till it measures two fluidounces. Lastly, add this to the first liquid and mix thoroughly. If after standing 24 hours a sediment should be observed, decant the clear collodion, which should possess a decided green color, and preserve it in a close bottle.

*Sinapic Collodion.*—Mr. Tichborne also suggests the following recipe for applying oil of Black Mustard as a rubefacient:

Take of Volatile Oil of Black Mustard a fluidrachm.

Collodion, six fluidrachms.

Acetic acid (glacial) gtt. xx.

The acid is introduced to modify the consistence of the collodion. This preparation occasions more pain than that with

cantharides, and is less active as a vesicant. Mr. T. suggests that both this and the cantharidal vesicant may be diluted with common collodion, so as to become merely rubefacients.

*The Granulation of Medicines.*—Dr. Thomas Skinner, of Liverpool, has called attention to this subject in a detailed article, at page 573 of the *Pharmaceutical Journal*. After referring to a paper by Dr. Henry Kennedy, of Dublin, in the *Dublin Medical Press*, who lays it down as an axiom in therapeutics, that the form of powder "is the most efficacious in which a medicinal substance can be administered," he expresses himself of the same opinion, and says he has frequently sought a method of rendering powders more easy of deglutition, and less offensive to the nose and palate, and concluded that the form of *granules* would meet the difficulty. On consulting with Mr. Samuel Banner, Pharmacist, of Liverpool, and calling his attention to the "Poudres Granulées" of the French, the process of preparing which with syrup and heat is a part of the confectioner's art, that gentleman at once suggested a very simple plan, by means of which pulverulent medicines may be granulated to a firm consistence, with the aid of but little heat and moisture, with the production of a granular powder that may be swallowed with water without leaving a trace of the medicinal substance, or the slightest sensation to indicate its recent presence near the nerves of taste and smell. The process is analogous to that for granulating gunpowder.

*Method of preparing the granules.*—The first step is to procure the material of good quality. The powders need not be *very* fine in order to form granules, hence sifted ground powders may be used.

1. *Making the Mass.*—The powder, however obtained, is put into a wedgewood mortar, and sufficient mucilage of gum arabic (U. S. P. or Lond. Ph. strength) is added to make a mass of so dry a consistence that it will readily crumble, and not be adhesive when rubbed against a coarse sieve, a condition soon learned by practice. The powder may also be made into a stiff paste rolled into flat thin cakes, dried at a low temperature, and coarsely powdered or bruised in a mortar.

2. *Granulating and sifting.*—The process requires three



sieves of the sizes of 12, 15, and 20 meshes to the linear inch, and these are to be fitted together like a drum sieve, the coarsest being at the top, the finest at the bottom. The mass is now rubbed through the top sieve with the open hand, the sieves are then shaken as in ordinary sifting. The second sieve will retain the larger granules, the lower sieve the finer, whilst the pulverulent particles pass through below, and may again be treated after being damped in the manner as before. When the mass is formed into cakes and bruised, it is sifted in the same way, the finest particles being worked over again.

3. *Drying, Coating, and Water Proofing the Granules.*—The granules by the first process are spread on paper and occasionally stirred till dry, or if the process is not injurious to some ingredient they may be dried in a metallic pan subjected to a moderate heat, with constant stirring, or more speedily in a current of dry hot air with occasional stirring. When perfectly dry they are placed in a mortar, or capsule of convenient size and a sufficient quantity of strong tincture of tolu (3iij. to f.3j.) in which any flavor desired has been dissolved and stirred until the entire mass of granules appear to be equally coated and glossy, when they are again subjected to the drying process with constant stirring.

Granules well prepared in this manner are compact, and to some extent insoluble in cold water; a desideratum, as they may be conveniently administered in that vehicle, without imparting to the water the slightest taste, smell, or color. The proportion of gum in these granules on an average is one-sixteenth, and that of the tolu too small to estimate, so that in calculating doses, but little abatement need be made for these excipients.

*Advantages of Granulation.*—This form tends to preserve medicines containing volatile active principles. With the exception of extracts, granules contain a larger percentage of active matter than most other preparations of drugs, and for this reason many saline and caustic irritant remedies should not be exhibited in this form, that of solution being more appropriate.

Again, as all the officinal pill masses are capable of being as easily granulated as powders, it is not improbable that pills may be to some extent superseded by granules. The granulation

of pill masses would render them more certain and rapid in their action, more easily administered to children and many adults, and the doses easily proportioned; if once introduced into use, they would become an imperative necessity, owing to popular favor.

*Doses and mode of administering granules.*—As the quantity of excipient is only a sixteenth, the doses of the official powders may be considered appropriate for granules. They may be dispensed in separate dose packages or in bulk. The denser condition of these granules occasion them to occupy less space than the simple powders. A teaspoonful (unheaped) of charcoal granules equals 50 grains; of compound powder of rhubarb, 70 grs. Mr. Banner's method will not answer for extemporaneous prescriptions, involving too much time.

Granules are administered—1st, by placing the dose on the tongue, and then swallowing them with a mouthful of water; or 2d, by stirring up the dose in a wine-glassful or part full of water, and swallowing the whole. The latter is the more approved method.

Dr. Skinner concludes his paper with a special recommendation of this form for the powders of charcoal and ergot. Of the former he says, the disgust occasioned by the color and behaviour of charcoal powder is entirely avoided in granules, a teaspoonful of which may be taken thrice daily without annoyance.

Granules of ergot should be of the smaller size, as more soluble, and when made from fresh active powder, retain their power much better than the powder; and he has found them more certain and reliable than any fluid preparation that he has tried.

*Ratio of value between Imperial and Wine measure.*—The following fact has been brought to our notice by Mr. Alfred B. Taylor, of Philadelphia. It may prove useful in practice in aiding calculations:

A curious relation exists between the pint apothecaries' or wine measure, and the pint Imperial measure: the Imperial pint being almost exactly one-fifth larger than the wine pint.

A wine pint = 28.875 cubic inches, or 7291.11 grs.

Add one fifth = 5.775 " " " 1458.22 "

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34.650 " " " 8749.33 "

An imperial pint = 34.659 cubic inches, or 8750 grs.

## GLEANINGS FROM GERMAN JOURNALS.

By J. M. MAISCH.

*Preparation of Iodine.*—Dr. Luchs publishes in Wittst. V. Schrift x. 586—539, a new method for preparing iodine, which was employed by him in 1857, and which he thinks will be found advantageous on a large scale. The saline residue for the preparation of iodide of potassium was dissolved in water, and treated with sulphuric acid and powdered bichromate of potassa; after continued stirring, the iodine crystallizes out, and but little remains in the mother liquor which may be gained by distillation. The iodine is strained off, washed with little water, and sublimed in a retort from a steambath. The reaction is as follows:  $3\text{KI} + \text{K}_2\text{O}, 2\text{CrO}_3 + 8\text{H}_2\text{O}, \text{SO}_3 = 4(\text{K}_2\text{O}, \text{SO}_3 + \text{H}_2\text{O}, \text{SO}_3) + 3\text{I} + \text{Cr}_2\text{O}_3 + 4\text{H}_2\text{O}$ . From the dark green liquid, sulphate of potassa and oxide of chromium may be obtained, which will cover a portion of the costs.

*Analysis of Anacahuile Wood.*—Dr. L. Müller analyzed the bark and wood separately. He obtained much oxalate of lime, sugar, starch, tannin, producing a green black precipitate with ferric salts, citric and humic acids, resin, wax, and a little bitter extractive. The tannate of lead has the composition  $3\text{PbO}, \text{C}_{16}\text{H}_{12}\text{O}_{10}$ , and appears to be allied in composition to catechu-tannin. The humic compound is composed of  $\text{C}_{16}\text{H}_{10}\text{O}_{14}$ , the resin of  $\text{C}_{48}\text{H}_{34}\text{O}_{20}$ . Kinic acid was not present. The bark dried at  $100^\circ\text{C}$ . yielded 17.673 per ct., and the wood 3.776 per ct. ashes, or the wood together with the bark 7.25 per ct.; medicinally the large proportion of oxalate of lime, also of tannin, requires some attention.—(Wittstein's V. Schr. x. 519—536.)

*Color of Wafers.*—Professor Wittstein found in red wafers 42 and 25.59 per ct. red lead; in yellow wafers, 14.03 chromate of lead, and 18.78 sulphate of baryta; in green wafers 38.43 ashes, of which 13.50 was chromate of lead; the Prussian blue was not estimated. Of four kinds of blue wafers, three were colored with ultramarine, and one with Prussian blue; one of the former contained traces, another 7.37 per ct.  $\text{PbO}$  in the form of carbonate of lead. White wafers and the following four kinds contained only traces of lead; violet, rose and flesh-colored

wafers were colored by lakes; brown wafers by ochre.—(Wittst. V. Schr. x. 557—559).

*Pilules contre la goutte et les Rheumatismes de Lartigue*, which are sold in boxes containing twenty-four pills, for ten francs, are composed, according to Professor Wittstein, of 2 grains powdered colchicum seed and  $\frac{1}{2}$  gr. sugar and mucilage, each pill weighing about  $2\frac{1}{4}$  gr.; they are rolled in lycopodium.—(Wittst. V. Schr. x. 598—600).

*Purification of Fusel Oil*.—B. Hirsch rejects the fractional distillation of crude fusel oil, either with or without previous washing with water. He removes most of the alcohol by agitating the crude liquid with a concentrated solution of table salt, repeating the operation three or four times, until the volume ceases to be diminished. The fusel oil, still containing traces of alcohol, is distilled with three or four times its quantity of water, like the essential oils. The aqueous portion of the distillate contains all the alcohol, and the fusel oil is obtained colorless and pure, without imparting much of its disagreeable odor to the atmosphere. It is remarkable that, from beginning to end, the oil distills in relatively the same quantity, so that it suddenly ceases to appear in the distilling vapors, which now contain only pure water. It is from this behaviour that the apparatus afterwards have scarcely an odor of fusel oil, and are easily cleansed. Thus the whole of the fusel oil is obtained, except the minute portion dissolved by the wash waters.—(Bucher's N. Repert. x. 294—297.)

*On Chelidonic Acid*.—Professor G. F. Walz has prepared this acid according to Zwenger's directions (see Am. Journ. Ph. xxxiii. 10.) from 200 lb. Chelidonium majus, and obtained by ether, a small quantity of an acid, which from its baryta salt and from its solubility in ether, (1000 parts dissolved .016 to .017), turns out to be succinic acid. This acid had been found in celandine by Reinsch (Jahrb. d. Ph. xiv. 34.) W. Engelhardt (Zeitsch. f. Chem. and Pharm. iii. No. 20) obtained by ether a solution of malic acid, which, after neutralization with lime, was decomposed into succinic acid. Walz supposes that the succinic acid  $C_8 H_6 O_8$  originates from the malic acid  $C_8 H_6 O_{10}$  through the

deoxidizing influence of sulphuretted hydrogen, and he has succeeded in obtaining it from malic and from tartaric acid  $C_6H_8O_{12}$  by heating a saturated solution of either of these acids in hydriodic acid, enclosed in a sealed tube, to 120 or 130° C. for six to eight hours. *Escholtzia Californica*, *Papaver somniferum* and *Teucrium scorodonia*, treated by Zwenger's process, yielded likewise succinic acid.—(N. Jahrb. d. Ph. xv. 22—28.)

*Pate Iodifère*, a French nostrum, sold for killing the nerves of decayed teeth, at 5.50 francs per flask, was found by Leimbach, of Karlsruhe, to consist only of arsenious acid and hydrochlorate of morphia, colored by a little Prussian blue. The proportions are one part arsenious acid and three parts of the morphia salt, rendered pasty apparently by glycerin.—(N. Jahrb. d. Ph. xv. 272.)

*Oil of Valerian*.—Mayer of Heilbronn has made some experiments with dry valerian root. He found the root collected in spring to yield more acid and less oil than the fall root; calculated for 10 lbs. of the root he obtained in 1858, 4.3 drachms valerianic acid and eight dr. oil; in 1859, 6 dr. acid and 5½ dr. oil. The oil cost him per oz. \$1.25 and \$1.60 respectively. Even if the acid was assumed at the same price as the oil, the ounce was respectively \$0.96 and \$1.07, while the oil is quoted by the best druggists at 60 cents per oz. He intimates that *oleum templinum* and *ol. terebinthinæ* are much cheaper than *ol. valerianæ*.—(N. Jahrb. d. Ph. xvi. 21—22.)

*Glycerin*.—Mayer found in commercial glycerin of spec. grav. 1.21 chloride of calcium, which he removed by digesting with oxide of silver, precipitating the dissolved silver by sulphuretted hydrogen, and the lime by oxalic acid. A volatile acid was expelled, for the greater part, by heating to between 257 and 279° F. for several hours; its spec. grav. was then 1.27, and the yields from 6½ lbs. after filtering through charcoal, amounted to 5 lbs.—(N. Jahrb. d. Ph. xvi. 23.)

*Extractum Belladonnæ*.—Mayer prepared extracts from two lots of well-dried belladonna root by exhausting with a mixture of 3 p. alcohol and 2 p. water; he obtained 27 and 26.28 prct.

respectively. The atropia was separated in two different ways: 1, by dissolving 5 grms. of the extract in alcohol, precipitating with subacetate of lead, treating the filtrate with sulphuretted hydrogen, evaporating to 1 gm., adding ammonia, agitating repeatedly, with pure ether and evaporating the ether spontaneously. Yield .040 gm.=.8 per ct.; 2.10 gm. were triturated with a little water and ammonia, agitated with ether, the ether evaporated, the residue dissolved in acetic acid, decolorised by animal charcoal, evaporated and treated with ammonia and ether. Yield .125 gm.=1.25 per ct. averaging 1.02 per ct. for the extract, or .26 to .27 per ct. for the dry root. The author was unable to separate atropia by the same process from belladonna extract, prepared from the fresh herb by the process of the Württemberg Pharmacopœia.—(N. Jahrb. d. Ph. xvi. 24.)

*Stearoptens.*—J. Wandsleben analyzed crystals deposited from aqua pelroselini; composition  $C_{20}H_{14}O_8$ ; also octohedrons from spiritus juniperi; composition  $C_{12}H_{14}O_{12}$ .—(N. Jahrb. d. Ph. xvi. 82.)

*Sophistications.*—J. Franck obtained a commercial jalap, which was mixed with tubers deprived of the resin. The tubercles of the true tuber had disappeared, the nearly parallel wrinkles formed in irregular shapes, enclosing deeper plains; their odor reminded of aqueous extract of jalap, and the section was of a dirty white color, without darker lines. Cold water assumed a dark brown color, while it is scarcely colored by good jalap.\*

The author met with a lycopodium of a fine granular appearance, in which he detected the pollen of several coniferæ, to the amount of about 50 per ct.

Under the name of scammony at \$8.00 per lb. he obtained from different drug houses an artificial product, consisting of

\* The same adulteration has been practised with some jalap of our commerce, and the exhausted tubers correspond in appearance with the description given above. I have seen several samples with longitudinal incisions, made apparently with a sharp knife, which facilitates the extraction. But was this done by unscrupulous druggists here, or was the article imported in this state?

J. M. M.

the smallest portion of resin, but mostly of the meal of leguminous seeds; once also mixed with crushed peas.—(N. Jahrb. d. Ph. xvi. 83, 84.)

*A new Volatile Acid in Hops* has been discovered by Dr. F. L. Winkler. Lupulin is distilled with water acidulated with sulphuric acid; the distillate is moderately heated with pure carbonate of lime, and the filtrate evaporated. The lime salt is of a gummy appearance, and possesses the strong odor of hops, like the other salts of the same acid, which resembles valerianic acid. The author is now investigating it.—(N. Jahrb. d. Ph. xvi. 134.)

*The quantity of Iodine in Cod Liver Oil* was estimated by S. Neininger, by saponifying the oil with caustic soda, incinerating the soap,\* exhausting the ashes with alcohol, distilling and precipitating with nitrate of palladium. 500 grm. oil yielded .396 Pd. I=.278 I=.0556 per ct.—(N. Jahrb. d. Ph. xvi. 134.)

*Hemine*.—E. Scriba, who experimented with Professor Dr. Simon in preparing hemine crystals from recent and forty years' old blood spots, recommends novices to experiment first with recent blood spots before undertaking a forensic detection of blood. The preparation treated wrong will never yield crystals. He observes:

1. Very old blood spots will yield hemine crystals as long as any coloring matter of blood remains.

2. Spots which do not yield their coloring matter to water, are best dissolved by boiling with glacial acetic acid; cold maceration of the dried blood may be even sufficient and preferable in such cases where other substances may be dissolved by boiling acetic acid.

3. The cold aqueous maceration must not be omitted where acetic acid might dissolve other coloring matters or compounds; if possible, both solutions ought to be made and examined, as one may corroborate or complete the other.

4. The extract with acetic acid ought to be made at once, as

\* It is to be presumed that the soap, together with the mother liquor, was incinerated, as the latter would contain much of the iodine.

concentrated as possible, and evaporated at a very gentle heat; a few drops of a concentrated solution yields a better result than a large quantity of a diluted one.—(N. Jahrb. f. Ph. xiv. 129—134.)

*Ammonium-Iron.*—The galvanoplastic deposit from protosalts of iron in presence of an ammonia salt, resembles polished steel, and adheres well when in very thin layers, but peels off in scales when thicker. After washing with water, the precipitate loses ammonia over caustic potassa, and when ignited, and in boiling water, an evolution of hydrogen is observed. Dr. Meidinger views this as a compound of iron, with the hypothetic metal ammonium. The quantity of combined ammonium is very small; in one sample he proved not over  $1\frac{1}{2}$  per ct.—(N. Jahrb. f. Ph. xvi. 295. 296.)

*Estimation of Chlorine in organic compounds.*—Dr. Carius has modified his method of estimating the inorganic elements in organic compounds (heating in a sealed glass-tube with nitric acid and estimating the products of oxidation) for chlorine, bromine and iodine, by adding a small excess of nitrate of silver. The decomposition is, with the exception of the aromatic series, readily effected, frequently at ordinary temperature; the bodies just mentioned are best decomposed in presence of bichromate of potassa, when the resulting chromate of silver is removed by diluting the acid liquor and boiling. Excess of silver salt has no effect on the accuracy of the analysis; but a large amount of even dilute nitric acid dissolves chloride of silver, and renders the neutralization with carbonate of soda requisite.—(N. Jahrb. f. Ph. xvi. 283, 284.)

*Reaction of Hydriodic Acid with Glycerin.*—Dr. Erlenmeyer states that the distillate obtained from glycerin, with little hydriodic acid, contains much iodide of allyle; on increasing the acid, the allyle iodide diminishes, and in its place iodide of propyle appears in the distillate, which boils between 85 and 90° C., is very refractive, and resembles in odor iodide of ethyle. The supernatant liquid of the crude distillate yields sometimes iodoform on neutralizing with potassa. The residue in the retort is black resinous, and yields, when distilled with



water, white insoluble crystals; treated with alcohol, the alcohol evaporated and the residuary liquor mixed with solution of potassa, a brown solution is obtained, and white crystals containing iodine and possessing a peculiar aromatic odor. The crystals have not been examined yet.—(N. Jahrb. f. Ph. xvi. 290.)

*Odontine, Toothpaste*.—96 parts prepared oyster-shells, 4 p. pumice stone, 12 p. orris root, 20 p. Castile soap, 16 p. syrup, 1 p. oil of peppermint; 1-12 p. oil of cloves, 10 p. water, 10 p. alcohol; the whole to be well mixed and dried.—(Winkler, N. Jahrb. d. Ph. xiv. 309.)

*Bryonitin*, (see A. J. Ph. vol. xxxi. 249.)—Prof. Walz reports investigations of Mr. Cucuel, which disprove the existence of bryonitin; this supposed compound proves to be a crystalline fatty acid and saponifiable fat of a bitter taste, caused by a little adhering bryonin, the latter rendering it soluble in boiling water.—(N. Jahrb. d. Ph. xvi. 8-10.)

*On Colocynth*.—Prof. Walz recommends the process of Hübschmann for preparing colocynthin sufficiently pure for medical use. The process consists in precipitating a concentrated aqueous infusion with carbonate of potassa, and purifying the precipitate by dissolving it in ether. The colocynthitin (see A. J. P. xxxi. 381) proves to be a white crystallizable resin destitute of taste, of the composition of  $C_{40}H_{32}O_9$ .—(N. Jahrb. d. Ph. xvi. 10, 11.)

*Oleum and Aqua Amygdalæ Amaræ*.—Michael Pettenkofer concludes from a series of interesting experiments, that the strongest bitter almond water is obtained as follows: press the bitter almonds well, and add 11-12ths of the residue gradually to boiling water, and allow to cool; add the cold prepared emulsion of the remainder; macerate for six or twelve hours, then distil slowly. The boiling water coagulates the emulsin and albumen, but dissolves the amygdalin, which is readily decomposed by the emulsin of the emulsion subsequently added.

The almonds may be expressed between 40 and 50° R. (122 and 144° F.) without injury to the oil, the amygdalin, or emulsin. The press cakes preserve their virtues for a long

time, provided they are kept dry. The simplest and most reliable method of estimating the hydrocyanic acid of bitter almond water, is that proposed by Liebig. To 500 grs. of the water add a little caustic potassa, and 1 or 2 grs. chloride of sodium; now add, drop by drop, a solution of 63 grs. pure nitrate of silver in sufficient water to weigh  $12\frac{1}{2}$  ounces, until a permanent turbidity of chloride of silver takes place; 300 grs. of the silver solution indicate 1 gr. anhydrous hydrocyanic acid.

To obtain a clear bitter almond water, add 6 drops dilute sulphuric acid to 12 oz. of the freshly distilled water.—(N. Rep. der Ph. x. 338—359.)

*Rish-e-Taft, Taftroot.*—Prof. Dr. C. Schroff received from Dr. Polak, physician to the Shah of Persia, this root, which is used in various nervous diseases. From his experiments on rabbits, the author concludes, that the root belongs to his 3d order of the narcotics, and is allied to *Hyoscyamus*, *Atropa* and *Datura*. On referring to the herbarium of the University of Vienna, the author pronounces it to be the root of *Scopolia mutica*, Dunal, but regards it as probable that the root of *Hyoscyamus bipinnatisectus*, Boissier, may likewise be used under the above name.—(Buchner's N. Rep. x. 364—384.)

*Croton Erythraema*, Martius, yields by incisions a blood-red juice called by the Brazilians *Sanque de Drago*, which, according to Th. Peckolt, is used as an astringent in chronic diarrhœa, gonorrhœa, fluor albus, hæmorrhages, and as an application to wounds. The astringency appears to be due to ordinary tannin; it further contains gum, pectin, albumen, sugar, resin of an agreeable benzoin odor, gallic acid, erythraemic acid and inorganic salts.—(Archiv. d. Ph. cviii. 142—154.)

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#### DETECTION OF $\frac{1}{1000}$ OF A MILLIGRAMME OF QUINIA.

By F. A. FLUCKIGER.

(Presented to the Annual Meeting of the Apothecary's Society of Geneva.)

In the March number of the "Swiss News," 1861, page 65, I have called attention to the fact that the well-known fluores-

cence of the sulphate of quinia is a finer agent for discovering its presence than all other known reagents for quinia. Induced by the wonderful sensibility of spectral analysis for the discovery of many substances, I sought the limit of fluorescence of a quinine solution, and found, to my astonishment, a most extraordinary intensity. One is able to discover through the reaction of ammonia and prussiate of potash 1-8000th to 1-10,000th of quinia. When sulphuric acid is in excess, the fluorescence is observable if there be but 1-100,000th of quinia present, when you fill a common test tube with the solution, expose it to the sunlight, and hold a piece of black paper against it. At a higher dilution the fluorescence disappears to the eye altogether, but it becomes visible at once, if a pencil of rays is made to fall vertically, or even obliquely through the tube when the outline of the converging rays is clearly observable, when the solution of sulphate of quinia contains only 1-200,000th of alkaloid. Yet this reaction is so extremely acute, that by very favorable light and a careful manner of proceeding, (strong magnifying tube of the utmost possible focal distance, pure white glass, and dark background,) the 1-400,000th to the 1-500,000th becomes visible. In this way one can absolutely discover 1-2000th to 1-4000th part of a milligramme of quinine. This extraordinary sensibility exceeds anything that the analysis of the alkaloids has furnished to this time, the reactions of strychnia only showing a close approach to such great acuteness. The simplicity and certainty of this test compares favorably with the spectral analysis, which shows only a much greater sensibility for sodium, strontium, and calcium; while, for instance, the spectral analytical reaction reaches its limit for copper at 1-275th milligramme, and for potassium and boracic acid at 1-1000th milligramme.

It seems that so sensitive a reaction for quinine is of no practical utility, but this is no reason that it should be overlooked.

In conclusion, I will observe, that *æsculin* and *chlorophylle* behaves in the same manner in reference to light.—*Witts. Vierteljahresschrift*, 1862.

F. L. J.

## PRESERVATION OF COLD INFUSION OF SENNA BY FILTERED AIR.

According to the observations of Dusch and Schräger, moist organic matter may be not only kept for months but for years, under cold water, if you put them in a matrass and expose them to the heat of a water bath, and close them afterwards with a stopper of cotton. The authors try to explain this wonderful fact by supposing that the cause of the decomposition by putrefaction or fermentation of organic matter depends on the presence in the water of certain extraordinarily minute germs floating in the air. The heat destroys these germs as they exist in the air of the matrass, and the stopper of cotton put on afterwards will allow the air to pass in, but keeps back the germs which are contained in it.

This discovery, so theoretically and practically important, has induced Folberth, an apothecary of Mediasch in Siebenbürgen, to try it for the preservation of medicinal substances which are apt to spoil easily. He first tried compound infusion of senna, by heating a freshly prepared infusion to the boiling point, then closed the matrass with a cotton stopper, and kept it in a room where the temperature was usually 72°. After the lapse of a month he opened the matrass; the infusion was clear, and not to be distinguished by color, smell or taste from one freshly prepared. The small sediment at the bottom of the vessel was the result of the clarification of the fluid by deposition. The cotton stopper being replaced by a cork, mouldiness began to show itself the second day.

An infusion prepared at the same time and kept along side of the other, but closed with a cork, exhaled a spoiled smell on the third day, and mouldiness on the fourth appeared.

To avoid the necessity of boiling and restopping with cotton, after each use of the infusion, the author recommends the use of a syphon arranged at the beginning by passing it through a cork, loosely closing the entrance and passing through the cotton stopper, the long end of the syphon being furnished with a gum-elastic tube and pressing spigot, or cut-off, of wire. The tube is to be filled at first. As the infusion is drawn off, the air enters through the cotton, and is deprived of its power of injuring the liquid.—*Wittstein's Vierteljahresschrift*, 1862.—F. L. J.

## ON THE CHEMICAL CONSTITUTION OF THE WAX OF THE MYRICA CERIFERA.

BY GIDEON E. MOORE, B. P.

The fruit of the *Myrica cerifera* yields a wax which for many years has constituted, to a limited extent, an article of commerce in the United States under the names of Myrtle-wax, Candle-berry wax and Bay-berry Tallow. It occurs abundantly as a white incrustation on the small globular nuts of the plant. To prepare it in a nearly pure state, the berries are enclosed in bags of coarse cloth and kept immersed in boiling water until the fused wax collects on the surface; it is then poured off into pans in which it solidifies on cooling—in this form and without further preparation it is brought into commerce. It is employed in its pure state as a polish to diminish the friction between surfaces of wood moving in mutual contact, and in admixture with other fatty bodies as a substitute for bees-wax in the manufacture of candles. It is also used in polishing furniture and enjoys some popular repute as a remedial agent.

We are indebted for the first published account of this substance to Alexandre,\* Surgeon, correspondent of M. de Mairan, who mentions a wax obtained in Louisiana from the fruit of a tree about the size of a cherry tree, and resembling myrtle in appearance, which he states to have been employed by the colonists in the manufacture of candles. Mr. Alexandre likewise states that the water in which the berries have been boiled, when evaporated to the consistence of an extract, is a certain cure for the most violent cases of dysentery.

At a later period accounts of the tree or shrub were given by Marshal, Lepage-Duprat, and by Toscan, Librarian at the Museum of Natural History at Paris. The latter in a memoir in his work entitled *L'Ami de la Nature* gave a circumstantial description of the mode of collecting the wax in early colonial times.†

\* Hist. de l'Academie Ann. 1722 and 1725, pp. 11 and 39.

† "Towards the end of autumn when the berries are ripe, a man leaves his house, together with his family, to go to some island or bank near the sea shore where the wax trees grow in abundance. He carries with him vessels to boil the berries, and a hatchet to build a cottage where he may

The traveller, Kalm, speaking of myrtle wax, says, "in the country where it grows, they make excellent soap of it which washes linen perfectly white."

The first attempt to investigate the chemical composition of the substance was made by the Danish chemist, Dr. John, in the early part of the present century. By treating the wax from the *M. cerifera* with boiling alcohol, this observer separated it into two portions. To the soluble portion he gave the name of *cerin* and to the insoluble that of *myricin*, from the specific and generic names of the plant. Subsequently discovering as he supposed two identical substances in bees-wax, he conferred upon them the same names, which are even still in use.

In the year 1802 Mr. C. L. Cadet gave an account of the myrtle berry and the mode of culture, with experiments on the solubility of the wax in various menstrua, and mentioned that it saponified readily with the alkalies.

A few months later, Dr. John Bostock gave an accurate description of the physical properties of the wax, its comportment towards solvents and alkalies, and concluded by stating the

find shelter during his residence in this place, which is usually three or four weeks. While he cuts down trees, his children gather the berries. A very fertile shrub will afford nearly seven pounds. When these are gathered the whole family employ themselves in procuring the wax. They throw a certain quantity of the berries into the kettle, and then pour a sufficient quantity of water on them so as to cover them to the depth of about half a foot. They then boil the whole, stirring the grains about and rubbing them against the sides of the vessel in order that the wax may more easily come off. In a short time it floats on the water like fat, and is collected with a spoon and strained through a coarse cloth to separate it from any impurities which might be mixed with it. When no more wax can be obtained, they take the berries out with a skimmer and put others into the same water, but it must be entirely changed the second or third time, and in the meantime boiling water must be added as it evaporates in order to avoid retarding the operation. When a considerable quantity of wax has been obtained by this means, it is laid on a cloth to drain off the water with which it is still mixed. It is then melted a second time, and it is then formed into masses. Four pounds of berries yield about one of wax; that which is first obtained is generally yellow; but in later boilings it assumes a green color from the pellicle with which the kernel of the berry is covered."—*Translation in Nicholson's Journal*, vol. iv. p. 189.

affinity of myrtle wax to the fixed oils—at the same time giving it as his opinion that the vegetable waxes bear the same relation to the fixed oils of plants that the resins do to the essential oils, i. e., are derived from them by the process of oxydation.

Besides these early imperfect notices of the myrica wax, we have more recently an elementary analysis by Lewy, who found its composition as follows :

Carbon,	.	.	.	.	.	74.00
Hydrogen,	.	.	.	.	.	12.00
Oxygen,	.	.	.	.	.	14.00
						<hr/>
						100.00

Chevreul also examined the myrica wax. According to him it is completely saponified by potash-lye, and yields in the operation besides glycerine, stearic, margaric and oleic acids. As will appear in the sequel, this distinguished chemist must have operated on an adulterated specimen.

The wax employed in the following research was the commercial article as found in the drug stores of New Haven, and was collected in the vicinity of this place. To the kindness of Mr. E. W. Blake, Jr., I am indebted for a small specimen prepared by himself from berries gathered in Rhode Island, this enabled me to test the purity of the commercial wax. The latter though procured at different times from several sources, in no case appeared to have been adulterated, as shown by the uniform fusing point of the wax itself, and of the mixed fatty acids resulting from its sponification.

The wax, as existing in commerce, is of various shades of color, from grayish-yellow, nearly destitute of any other tint, to a rich deep green, due to chlorophyll; the odor is balsamic and slightly aromatic, much more powerful, however, in the dark than in the light colored varieties. These differences in appearance and odor are not connected with any material variation in the other physical properties, such as specific gravity and fusion point, which remain nearly constant throughout.

The specific gravity of myrtle wax ranges from 1.004 to 1.006 and the point of fusion from 47° to 49° C. Its hardness and brittleness are much greater than those of beeswax. According to Dr. Bostock one hundred parts by weight of boiling alcohol

dissolve five parts of the wax, four-fifths being deposited on cooling and one-fifth remaining suspended in the fluid, but gradually depositing after a few days, or it may be precipitated at once by the addition of water. Only four-fifths of the wax are dissolved by hot alcohol, the remainder being totally unacted on even by prolonged digestion with fresh quantities of the solvent. Boiling ether, according to the same author, dissolves more than one-quarter of its weight of the wax, of which, the greater part separates on cooling. At a moderate heat it is also taken up by oil of turpentine to the extent of six per cent.

With a solution of caustic potash, myrtle wax saponifies readily, giving a fragrant soap which is freely soluble in water, and which by decomposition with sulphuric acid yields a mixture of fatty acids fusing at  $61^{\circ}$  C., and readily soluble in hot alcohol. From this solution it may be wholly precipitated by an alcoholic solution of acetate of lead. Upon washing and drying the precipitate, and digesting it for several days at a moderate temperature with twice its bulk of ether, a waxy substance was dissolved which did not blacken by sulphide of ammonium and left no residue upon ignition, thus proving the absence of oleic acid. The portion dissolved by ether consisted of unsaponified wax, which being suspended in the solution of soap in a state of fine division escaped detection, was carried down mechanically in the precipitate produced by acids, thrown down a second time in the precipitate by acetate of lead, and was afterwards dissolved out by the ether.

A portion of the wax was saponified with litharge and the lead soap repeatedly washed with water. Upon evaporation of the washings in vacuo, a viscid fluid was obtained possessing the sweet taste and other characteristic properties of glycerine; the quantity obtained was, however, quite small in proportion to the amount of wax employed.

About two pounds of the wax were then saponified with caustic potash and the soap decomposed by sulphuric acid, the precipitate was fused and agitated repeatedly in contact with renewed portions of distilled water, and finally dried. It possessed a fusing point of  $60^{\circ}$  C. A portion of this substance was introduced with a considerable quantity of distilled water into a capacious retort and subjected to distillation; after about one-half



of the water in the retort had passed over, the distillate was found to contain a few globules of fused fat floating on its surface; these were collected and their fusing point taken; it was found to be identical with that of the substance previous to distillation, thus proving conclusively the absence of the more volatile fatty acids.

One hundred grammes were taken, and, after solution in alcohol, were subjected to fractional precipitation, the method originally proposed by Heintz being employed under the following modification. The alcoholic solution of the fatty acids was made of such strength that the degree of saturation at which a precipitate separated on cooling to the ordinary temperature of the atmosphere, was almost, but not quite, attained. The solution was measured and one-tenth part was poured into another vessel, this portion was then precipitated as accurately as possible by a saturated alcoholic solution of acetate of lead. The precipitate, together with the fluid in which it was suspended, was now poured back into the remaining portion of the solution, and the whole heated to ebullition, and maintained at that temperature until the precipitated lead salt was redissolved and the fluid was brought to nine-tenths of its original bulk. The whole was then set aside to cool, by which the precipitate was a second time thrown down. This precipitate was collected on a filter and dried, as the *first fraction*. A portion of the filtrate equal to that first taken was now precipitated accurately with acetate of lead, the precipitate with the fluid in which it was suspended was poured back into the rest of the solution, the whole heated and evaporated until brought to eight-tenths of its original bulk, and after cooling, the precipitate collected and dried as the *second fraction*. This operation was repeated until *nine fractions* in all had been obtained, the fluid to be precipitated occupying successively,  $\frac{9}{10}$ ,  $\frac{8}{10}$ ,  $\frac{7}{10}$ ,  $\frac{6}{10}$ ,  $\frac{5}{10}$ ,  $\frac{4}{10}$ ,  $\frac{3}{10}$ ,  $\frac{2}{10}$ , and  $\frac{1}{10}$  of its original bulk. The last portion of fluid containing the *tenth fraction* gave no precipitate with acetate of lead, and upon examination was found to contain the ethylic ethers of the fatty acids with but very little free acids.

Of the fractional precipitates thus obtained, the 1st, 2d, 3d, 7th, and 9th were further examined. They were decomposed

by repeated boiling with moderately dilute hydrochloric acid, and the fatty acids thus separated were thoroughly washed by hot water. The fusing points of these products were as follows, respectively :

1st fraction, 60.5° C. ; 2d, 61.° ; 3d, 61.° ; 7th, 55.° ; 9th, 50°. The 10th fraction which gave no precipitate with acetate of lead remained fluid at 20.° C.

The fact that by long boiling the mixed fatty acids with water, a distillate was obtained which had the same fusing point as the original mixture, together with the narrow range of fusing points among the fractions first examined, made it appear unnecessary to study the others.

The products obtained from each of the above mentioned lead precipitates were severally subjected to repeated crystallization from alcohol, until the fusing point of the crystals stood unaltered by further treatment. From each fraction an acid was thus procured which fused at 62° C., and agreed in all respects with *palmitic acid*. The first three fractions consisted almost entirely of this substance, and it was present in considerable quantity even in the ninth fraction.

The filtrates from the crystallization of the 7th and 9th fractions were then mixed and subjected to recrystallization. A crop of crystals thus obtained likewise fused at 62° C. The new filtrates were then mingled and crystallized again with the same results.

The concentrated mother liquors from which nearly all the palmitic acid had thus been separated, were now evaporated nearly to dryness, and the mass saponified to destroy the ethers formed by prolonged contact with alcohol. The soap was decomposed by acids, the precipitate dissolved in alcohol, the fluid evaporated until a slight crop of crystals formed on cooling ; the fluid poured off from these was again evaporated until a deposit ensued on cooling, and this process was repeated until the crystals thus formed exhibited a constant fusing point, viz. 43° C. It thus appears that *lauric acid* is an ingredient of this wax. The 10th fraction which was fluid at ordinary temperature was found by similar treatment to consist almost entirely of *lauric ether* formed by prolonged contact with alcohol.

About one pound of the crude fatty acids was repeatedly agi-

tated with small quantities of boiling alcohol until the fusing point of the portion undissolved, remained constant at  $62^{\circ}$  C. The several alcoholic solutions thus obtained were then mixed and evaporated to the point at which crystals formed on cooling, the whole allowed to cool to the ordinary atmospheric temperature, the crystals thus formed removed, and the process repeated several times, by which means a still further portion of the least soluble substance was removed. The fluid filtered from the crystals was now treated with caustic potash and after addition of water the whole was heated until no more alcohol could be expelled. The precipitate obtained by treating this solution with sulphuric acid, was dissolved in alcohol and subjected to a fractional crystallization to remove palmitic acid, by which means a sufficient quantity of the substance fusing at  $43^{\circ}$  C. was obtained for an elementary analysis.

The two substances thus obtained, and which from their fusing points and other characteristic properties were pronounced to be respectively palmitic and lauric acids, were further purified by solution in alcohol, decolorization by animal charcoal, resaponification, decomposition of the soaps by acids, and careful washing with distilled water, by which means they were obtained in a state of nearly absolute purity.

The above operations were very much complicated by the fact of the strong tendency of lauric acid to form an ether when left for any length of time in contact with alcohol. In this respect it far surpasses palmitic acid. A mixture of these two acids in which there was a great preponderance of the latter, was digested for several days in alcohol at the ordinary temperature of the atmosphere. Upon adding a weak solution of potash to remove uncombined acid, and finally washing with water, an oily fluid was obtained which became solid by a very slight decrease in temperature, and which upon examination turned out to consist of nearly pure laurate of oxyd of ethyl. This ether could only be decomposed by prolonged digestion at a moderate heat with a very concentrated solution of fixed caustic alkali.

The palmitic and lauric acids obtained in the preceding operations were subjected to combustion with oxyd of copper and oxygen gas, with the following results:

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0.1967 grms. palmitic acid gave 0.54 grms. carbonic acid and 0.228 grms. water.

			Theory.	Experiment.
C <sub>32</sub>	.	.	192	75.00
H <sub>32</sub>	.	.	32	12.50
O <sub>4</sub>	.	.	32	12.50
				. . . .

0.1857 grms. lauric acid gave 0.4917 grms. carbonic acid and 0.202 grms. water.

			Theory.	Experiment.
C <sub>24</sub>	.	.	144	72.00
H <sub>24</sub>	.	.	24	12.00
O <sub>3</sub>	.	.	32	16.00
				. . . .

A portion of the crude wax was repeatedly treated with fresh quantities of boiling alcohol until no further solution ensued, the residue was several times crystallized from hot ether, and finally, after decolorization with animal charcoal, maintained in a state of fusion for some time to remove volatile impurities derived from the ether. It possessed the fusing point, hardness, and other properties of pure *palmitin*. Since, according to Bostock, boiling alcohol dissolves only four-fifths of the wax, the amount of *palmitin* present may be approximately stated at one-fifth of the whole.

The results of the foregoing experiments indicate that the wax of the *Myrica cerifera* consists of about *one-fifth* part of *palmitin*, the remaining *four-fifths* being free *palmitic acid* with a small quantity of *lauric acid*, the latter either free or in the state of *laurin*.

With regard to the uses of this substance, its composition and abundance suggest it to the chemist as the most convenient and accessible source of pure *palmitin* and *palmitic acid*, and it will probably be the means of increasing in no small degree our knowledge of these bodies and their derivatives. As a substitute for beeswax in the manufacture of candles, the *myrica wax* appears to be worthy of more attention than it has yet received. In illuminating power it seems to be scarcely, if at all, inferior to the best beeswax. It can be furnished at less than one-fourth of the cost of the latter material, and owing to its superior hardness it can be cast, instead of having to be subjected to the tedious and expensive process of moulding by hand. By care in

preparation, it can be obtained more free from color than crude beeswax, and moreover, it is said to be rendered perfectly white by the ordinary modes of wax bleaching. It might probably be used also with advantage to harden paraffine candles.

Taking into consideration the abundance of the plant itself, its hardy habits of life—in fact it thrives best upon soils which from their poverty and proximity to the sea are unfitted for all other purposes of cultivation—the slight degree of attention required to insure abundant crops, and finally the ease of extraction of the wax itself, there appears to be no reason why the preparation of myrtle wax should not constitute an important branch of manufacturing industry.\*

The foregoing investigation was undertaken at the suggestion of Prof. Johnson, for whose guidance and assistance I here take pleasure in expressing my grateful acknowledgments.—*Amer. Jour. Sci. and Arts*, May, 1862.

## ON THE PRODUCTION AND SEPARATION OF METHYLAMINE.

By M. CAREY LEA.

In a previous paper I have pointed out that ammonias in which hydrogen is replaced by methyl are obtained by the action of nitrate of methyl upon ammonia at ordinary temperatures. Nitrate of methyl,† obtained by the distillation of methylic alcohol with nitric acid and urea, is placed in well stoppered bottles filled only about one quarter, together with a little more than its own bulk of thoroughly saturated aqueous ammonia, and is left till the nitrate of methyl disappears, or until only a few brown oily drops remain, a reaction which requires from three to six days, according to the temperature. The

\* In course of the preceding investigation a property of the *palmitate of silver* was noticed which I believe has not yet been placed on record. I allude to its becoming powerfully electric by friction. A small quantity of this salt, purified from extraneous fatty matters by digestion of ether, was gently rubbed in an agate mortar, when a sufficient amount of electricity was generated to cause the powder to fly out in every direction and cluster around the pestle and the hand holding it.—G. E. M.

† See page 223, *Amer. Jour. Pharm.*, May, 1862.

liquid is then distilled with caustic alkali, and the gaseous products are conducted into water.

In the solution we should by analogy expect to find ammonia, methylamine, dimethylamine and trimethylamine, and it remains to separate these bases. This is a matter of extraordinary difficulty, much surpassing that of the separation of the ethyl bases. In the ethyl series the bases differ from each other and from ammonia by  $C_4H_4$ , whereas in the methyl series the successive terms acquire the addition of  $C_2H_2$  only. Naturally, therefore, we must look for greater similarity in character and corresponding difficulty in separation. Accordingly, the methods which give such satisfactory results with the ethyl-ammonias, fail entirely with the methyl bases. Ammonia cannot be separated from them by a difference in the solubility of the sulphates in alcohol: when the mixed solution is neutralized with sulphuric acid and exhausted with alcohol, little or nothing is removed by it. Nor can the separation be effected by means of picric acid, although that substance may be used in one particular case mentioned below.

This problem I have as yet been able to resolve only in part. Two steps I have accomplished:—first, the complete removal of the ammonia from the mixed methyl bases, and second, the isolation of the methylamine in a state of purity. The separation of the more substituted bases still remains to be accomplished.

It is, however, satisfactory to have a process for obtaining perfectly pure methylamine without resorting to the troublesome reaction of the cyanate of methyl, and that much has been effected. After the compound ether has been completely decomposed by the ammonia, the contents of the bottles are to be distilled with caustic alkali or lime. The solution of the mixed bases and of ammonia is to be exactly neutralized with oxalic acid and the water driven off as far as possible by being heated over the water-bath. The resulting mass is transferred to a flask, and boiled a few minutes with a large quantity of alcohol of density  $42^\circ$  B., and after cooling and standing some hours, it is filtered. The whole of the ammonia remains as oxalate upon the filter. The filtrate by spontaneous or gentle evaporation separates into two layers. The lower, which is much the least

in quantity, becomes very soon crystalline; indeed this change takes place so rapidly that the fluid stage may easily pass unnoticed. More oxalate of methylamine remains in the mother liquid and separates on further evaporation.

After the fluid has crystallized, the resulting pearly white laminæ are purified by boiling with absolute alcohol, or with a mixture of equal parts of alcohol of 42° B. and ether, and this is repeated three or four times, allowing a thorough cooling to take place between each operation. The oxalate of methylamine finally crystallizes out quite pure, and methylamine may be obtained from it directly by distillation with caustic alkali. But the distillation is extremely unpleasant, exhibiting the phenomenon of percussive ebullition to such a degree as to endanger the whole apparatus, and to drive the liquid out of the Woulfe's bottle in strong jets through the safety tube. It is therefore advisable to treat the oxalate with nitrate of baryta or chloride of barium, leaving them in contact for a day, to evaporate the filtrate and then distill. I give the preference to the nitrate of baryta, because the nitrates of the ammonias distill more quietly than any of the others of these salts.

The methylamine thus obtained was converted into chloroplatinate and analyzed.\*

1.0105 grms. gave of Pt,	. . . . .	42.16
This corresponds to, per cent,	. . . . .	41.72
Theory requires for $C_2H_3$	} NCl, PtCl <sub>2</sub> ,	41.62
H		
H		
H		

The residue, after the greater part of the oxalate of methylamine had crystallized out, was evaporated, exhausted with absolute alcohol, treated with nitrate of baryta, distilled with caustic soda and neutralized with picric acid. From this solution there crystallized out beautiful amber-colored bevelled prisms and hexagonal plates greatly resembling the picrate of ethyl-

\* It is scarcely necessary to observe that if platinum salts are recrystallized, the result of their analysis cannot be taken as a proof of the accuracy of the mode of separation used. In the analyses here published care was taken to use in all cases an excess of bichloride of platinum, and to include the whole precipitate in the analyses.

amine and apparently isomorphous with it. These were converted into chloroplatinate and analyzed with the following result.

.7265 grms. chloroplatinate gave of Pt, .	.3025
This corresponds to, per cent, .	41.65
Chloroplatinate of methylamine contains, .	41.62
The substance was therefore picrate of methylamine.	

The residue appeared to be a mixture. Analyses of different portions, from different crystallizations gave respectively 39.85, 40.14, and 40.23 per cent. of platinum in the chloroplatinate, nor could any satisfactory means of separation be found.—*Amer. Jour. Sci. and Arts, May, 1862.*

## ON COLCHICIN.

BY PROF. G. F. WALZ.

From a lengthy paper, the continuation of which is promised, we make the following extracts:

The author in the presence of Mr. Hesse one of the discoverers of colchicin, obtained this bitter principle in small, white, oblique, rhombic crystals, possessing neither acid nor alkaline reaction, soluble in water and alcohol, less in ether, permanent in the air, and of a bitter taste. The crystallization is difficult: the mother liquor separates at first floccules, which in four to six days change into shining crystals, sinking to the bottom after two or three days. Now they must be separated, or else they will disappear again in a few days.

Colchicin contains nitrogen. Dissolved in water, it turns yellow, but remains clear with dilute sulphuric acid; on boiling, floccules were separated, and the filtrate contained sugar, but no bitter principle. On neutralizing with carbonate of potassa, darker color was produced, and a considerable white flocculent precipitate. The filtrate therefrom was evaporated to dryness, and treated with alcohol and diluted alcohol; both solutions left on evaporation shining yellowish brown residues separating with water white floccules. The precipitate by potassa dissolves in alcohol with brownish yellow color, and the solu-



tion dries to an amorphous shining mass, not entirely soluble in dilute sulphuric acid. The above precipitate obtained on boiling with sulphuric acid, was dissolved in warm alcohol, from which it separated in the form of shining small needles in radiating groups.

The products of splitting of colchicin appear to be colchicein, resin in yellow scales, body precipitated by potassa, matter soluble in water, resinlike body insoluble in ether.

The following are the reactions of solid colchicin and of its solution in 20 parts of water :

Sulphuric acid colors it yellow and dissolves it without decomposition ; on heating, decomposition takes place.

Nitric acid of 1.50 sp. gr. dissolves it greenish yellow, the fumigating acid with a deep violet color approaching indigo blue, finally yellow.

Muriatic acid of 1.161 sp. gr. similar to sulphuric acid.

Dilute sulphuric or muriatic acid produces with the solution a yellow color ; on heating, decomposition.

Dilute nitric acid yellow color ; on heating, deep orange and finally turbid.

Alkalies, their carbonates and the alkaline earths produce a yellow color, but no precipitate.

Ferric chloride, a deep color, no precipitate.

Acetate and subacetate of lead, sulphate of copper, ferrocyanide, ferridecyanide and sulphocyanide of potassium, acetic acid, chlorine water, chlorine gas and iodine water cause no precipitate.

Protonitrate of mercury, after 8 hours, a strong yellowish brown precipitate.

Corrosive sublimate, a white gelatinous precipitate, soluble in more water.

Nitrate of silver, a white precipitate, soluble in water, partly reprecipitated on standing.

Terchloride of gold, a golden yellow precipitate, soluble in water.

Bichloride of platinum, after 8 hours, a small precipitate.

Chromate of potassa no reaction ; after the addition of sulphuric acid a reddish color.

Tannin, from very dilute solutions a precipitate, caking together on heating into a resinous mass.

Tincture of iodine, a strong kermes colored precipitate.

Bromine water, a large white precipitate insoluble in water.

2 drachms of colchicin yield scarcely enough colchicein for a few elementary analyses.—(*N. Jahrb. d. Ph.* xvi. 1–8.)

J. M. M.

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#### ON THE DETECTION OF ARSENIC BY COPPER,

By H. REINSCH.

The following communication was published in Erdman's *Journal für technische Chemie*, lxxxii. 286: "In the Smethurst poisoning case, which was lately disposed of in London, the accused was acquitted in consequence of differing opinions of the two experts, basing their opposing views upon the employment of one and the same method, namely, Reinsch's test. This, as is well known, is very delicate and reliable, if its requisite cautions are observed; the blackish grey coating of the copper, with its metallic lustre, is very characteristic, and still two chemists had obtained different results by this method. From the deposition of one, it appears that the substance to be tested for arsenic had been previously treated in hydrochloric acid solution with chlorate of potassa, and had given a negative result with Reinsch's test. If we do not admit the supposition, that the arsenic detected by the other chemist, had been expelled in the form of chloride, it must be granted that by this treatment the arsenic had been oxidized to arsenic acid. Although Reinsch, in describing his method, speaks only of arsenious acid, it appears as if the easy precipitation by copper from the muriatic acid solution had been also ascribed to arsenic acid, and this opinion is verified by the statements of analytical authorities (see Fresenius' *Qualit. Analyse* 10, Aufl. §132, No. 7.) A large number of experiments have convinced me that arsenic acid or arseniates in muriatic or sulphuric acid solution do not produce the grey metallic mirror upon bright copper, either in the cold after standing for months, or by boiling long continued, or repeated in short or long intervals, unless the arsenic acid be

present in considerable quantity. Therefore the coating of copper with a grey mirror, is the property of arsenious acid only, if but a minute quantity be present." The reporter W. now mentions several experiments, showing that arsenic acid is not, or but incompletely, precipitated by metallic copper, and that this indifference must operate against the employment of copper for the detection of arsenic.

These statements induced me to institute experiments on the behaviour of metallic copper to arsenic acid, reports of which I had the honor to lay before the meeting of the German Apothecaries' Association at Coburg. But I had not concluded my experiments, and several objections were made, which I then could not answer, for want of experiments, but propose to do now.

Regarding the behaviour of arsenic acid to metallic copper, the statements of the above chemists are evidently incorrect, though I admit that heretofore I had not experimented with arsenic acid, because my test was, first of all, intended for cases of poisoning with arsenious acid, as arsenic acid does not occur in commerce, and I know not of a single case of poisoning by it.

A very dilute aqueous solution of arsenic acid was mixed with half its volume of pure muriatic acid, and boiled with bright copper wire. Not the slightest precipitate of arsenic occurred, and the copper remained perfectly bright. No alteration of the copper could be observed, after increasing the muriatic acid to one volume. But after taking to one volume of the solution two volumes of concentrated muriatic acid and boiling, the copper was instantly covered with the characteristic grey layer of arsenic. This reduction takes place even in very dilute solution, and the reaction of arsenic acid is not less delicate than that of arsenious acid, if calculated for the proportion of metallic arsenic, a solution of which, containing 1-100000, yields still good results, and then the dilution with muriatic acid has not yet been calculated. It seems, therefore, as if the English chemist failed with the reaction of arsenic acid simply from not having acidulated enough with muriatic acid. A liquid not very acid does not attack metallic arsenic, or but very slightly, and therefore no arsenic can be precipitated; but if the solution is sufficiently acid to dissolve the copper, the arsenic acid

will be reduced, and the precipitate takes place. Arsenious acid, however, is precipitated by copper even from faintly acidulated solutions.

It is difficult to conceive why, in the above case, the hydrochloric solution of arsenious acid was treated with chlorate of potassa. I have made about twenty experiments with arsenious and arsenic acid dissolved in muriatic acid, which, when treated with very small quantities of chlorate of potassa, gave sometimes no reaction whatever, with copper. I cannot explain this, except by assuming that thereby a very volatile superchloride of arsenic is formed, which is readily volatilized on boiling. The use of chlorate of potassa must, therefore, be strictly avoided.

Attention must be directed to still another precaution, namely, to treat only lukewarm with muriatic acid, the stomach and other substances to be tested for arsenic,—otherwise chloride of arsenic will be volatilized. It appears advisable to extract the substances in a flask with muriatic acid, which may be diluted with an equal bulk of water, and to collect the vapors in a separate vessel, so as to lose no trace of the arsenic. If arsenious acid is heated gently in a retort with muriatic acid, without boiling the liquid, oily drops of terchloride of arsenic and very strong muriatic acid are distilled over; the former, it appears, volatilizes readily in connection with gaseous muriatic acid.

In the beginning of these experiments I was of the opinion that arsenic acid could not be precipitated by copper, and I endeavored to reduce it previously to arsenious acid, which is easily accomplished by a current of sulphurous acid, and heating subsequently to boiling. A concentrated solution of arsenic acid thus heated, deposits on cooling arsenious acid in fine octohedrons, and contains no arsenic acid.

Lippert states (Am. J. Ph. 1861, 408) that the deposit upon copper consists of  $\text{Cu}_3\text{As}$ . Though I had at first supposed it to be pure arsenic, I have subsequently proven that it retains copper, and succeeded afterwards to separate it from copper by means of ammonia. I must suggest, however, whether this precipitate from arsenious acid might not more likely be  $\text{As Cu}_3$ , and the precipitate from the arsenic acid solution  $\text{As Cu}_3$ ,

corresponding in composition with the precipitates obtained by sulphuretted hydrogen; experiments which I have commenced, may clear this up. The suggestion of Lippert, that other metals are similarly precipitated by copper, appears probable for antimony, and perhaps for bismuth, which is precipitated in crystals, but most likely not for silver and mercury; but tin and lead, though enumerated among the others by Lippert, are not precipitated at all by copper from their solutions acidulated with muriatic acid.

In answer to the objections made at the meeting of the Association at Coburg, that all commercial copper contains arsenic, I have to state that I have never found this metal in the wire which I employ for my test. The wire is  $\frac{1}{2}$  millimetre in thickness, and is invariably heated to redness for several hours, enclosed in a box, subsequently, it is well scoured. Mere traces of arsenic render copper very brittle, so as not to be fit for fine wires, and these I consider almost pure copper, containing but traces of lead, silver and iron. The brittleness of sheet copper even is generally due to iron, and arsenic will probably rarely be found in minute traces. But even if the copper should contain arsenic, it could not be dissolved on boiling with muriatic acid, because the latter metal is then in an electro-negative condition. However, with the tests as proposed by me, the absolute absence of arsenic is proven by boiling for some time the copper wire with the muriatic acid, when the former must remain bright.

Another objection to my test was, that green colors which have recently appeared in commerce, yield a reaction similar to the arsenical colors. Blue or green ultramarine, when treated with muriatic acid, disengage much sulphuretted hydrogen, and leave a gelatinous greyish white mass. If ultramarine was adulterated with a copper arsenic color—the latter, however, are much dearer—the color would not disappear, and the solution would be of a green or brown color. Copper arsenic colors adulterated with ultramarine would turn brown, and evolve with muriatic acid sulphuretted hydrogen. The solution of ultramarine in muriatic acid colors copper blackish blue, sometimes steel blue, by a sulphur compound, which is not decomposed by a large excess of muriatic acid and long continued boiling, but

reacts, even when considerably boiled, with the metallic copper. If sulphuretted hydrogen is passed through muriatic acid, metallic copper will assume in the liquid a brown color, which disappears on boiling, leaving the copper bright; but long continued boiling will not remove the bluish black deposit in the above solution of ultramarine, and after the boiling has ceased, no gas bubbles will rise from the blackened copper. Copper, with a precipitate of arsenic deposited upon its surface, becomes positive electric, and dissolves now freely in the warm muriatic acid with the evolution of hydrogen, and may thereby be readily distinguished from the copper blackened by sulphur. Indeed, I have thereby discovered, and afterwards proved by other reagents, the presence of arsenic in samples of ultramarine. The latter being prepared by calcination of Glauber's salt, charcoal and clay, the source of arsenic is evidently the sulphuric acid; and though its proportion may be very minute, it must not be overlooked in forensic analysis. It must be remarked, however, that but little of the arsenic is dissolved by the hydrochloric acid, the greater portion remaining with the insoluble residue as sulphide of arsenic.

Of what nature the sulphur compound in ultramarine and in sulphuret of calcium may be, which is not decomposed by boiling muriatic acid, but produces the stated peculiar reaction with copper, cannot be decided yet: it is, however, decomposed by chlorate of potassa.—*N. Jahrb. d. Ph.* xvi. 185—148.

J. M. M.

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#### PROCESS FOR THE EXTRACTION AND INVESTIGATION OF POISONOUS ALKALOIDS.

By MM. V. USLAR and J. ERDMANN.

Many difficulties attend the extraction of an alkaloid when, as in medico-chemical researches, it is associated with other organic matters. The following is a method recommended both by its simplicity and its generality. It is founded on the following facts:—

1. Free vegetable alkaloids are soluble in amylic alcohol, especially by aid of heat.

2. Pure or alkaline water does not remove the bases thus dissolved; but,

3. It separates them completely when it has been previously acidulated with hydrochloric acid, the organic chlorides which are formed being almost insoluble in amylic alcohol.

The following is the method of operation:—Reduce the suspected matter into a pulp with water, slightly acidulated with hydrochloric acid. Then leave it to digest for two hours at a temperature of from  $60^{\circ}$  to  $80^{\circ}$  C.; pass a wet cloth over it, and exhaust the residue with acidulated warm water, and after mixing the liquids add a slight excess of ammonia; concentrate over an open fire, and dry in a water-bath. After exhausting the residue with warm amylic alcohol, filter it through a paper previously moistened with amylic alcohol.

The filtered product is generally mixed with fatty or coloring matters, which must be eliminated by quickly shaking up the liquid with almost boiling water, acidulated with a little hydrochloric acid. The amylic alcohol then yields the alkaloid, while it retains the greater part of the fatty or coloring matters. Draw it off by a small india-rubber pipe,\* then shake the warm aqueous liquid with a fresh supply of amylic alcohol, and the foreign matters will be got rid of without much trouble, so that the acid solution containing the alkaloid in the state of hydrochlorate is completely decolorised. Slightly concentrate this solution, add a slight excess of ammonia, and then amylic alcohol, which after repeated shakings takes up the alkaloid.

After duly separating the two layers of liquid, withdraw the upper one, containing alcohol and alkaloid, and attack the lower layer by adding a fresh portion of warm amylic alcohol; then mix the alcoholic liquids and evaporate them by a water-bath, and the residue is generally pure alkaloid. If it has preserved its color, the operator need not continue the operations just described; that is to say, dissolve in hydrochloric acid, shake with amylic alcohol, and draw off by a small pipe; supersaturate with ammonia, shake with amylic alcohol, and eliminate it by evaporation in a water-bath.

\* This precaution is essential to prevent the inhalation of the vapors of amylic alcohol.

It is very seldom that the alkaloid is not completely purified by this treatment; should it not be, the process must be repeated.\*

The authors have verified their process in various ways. Hydrochlorate of morphine mixed with panada, or putrid meat, exposed to the sun for fifteen days, was integrally detected by the special reaction it gives with sesquichloride of iron; nevertheless, the experiment was tried with less than a decigramme of hydrochlorate, mixed with 1 or 2 kil. of organic matter. The different portions employed varied between 0.054 grammes and 0.005 grammes.

They have also recovered a drop of nicotine and two drops of coniine respectively added to 750 grammes of panada.

The same with 9 milligrammes of strychnine, 8 milligrammes of narcotine, as well as with a mixture formed of 0.012 grammes of morphine and 0.018 grammes of narcotine mixed with a pulp of vegetables and meat, and left for four days to putrefy.

The alkaloids when recovered were separated from each other by ether.—*Chem. News, London*, April 26th, 1862.

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#### ON THE OCCURRENCE OF BERBERINE IN XANTHORRHIZA APIIFOLIA.

By J. DYSON PERRINS, F.C.S.

Having lately observed the presence of Berberine in *Hydrastis canadensis*, it appeared to be worth while to ascertain whether this alkaloid also occurred in *Xanthorrhiza apiifolia*, another North American plant, which belongs to the same natural order, Ranunculacæ. Professor Bentley having announced his early intention of describing the botanical characteristics, properties, uses, etc., of *X. apiifolia*, any account here is rendered

\* To all acquainted with the alteration produced in nicotine and coniine by the presence of air, it will be difficult to understand how alkaloids can escape the causes of decomposition to which they are exposed during this process, which not only does not protect them from the action of the air, but exposes them to it in presence of ammonia at the temperature of a water-bath.



unnecessary. Suffice it to say, that the root is of a fine yellow color, and popularly called in the United States, "Yellow root." I was indebted to the courtesy of Daniel Hanbury, Esq., for a specimen of this root; but finding a large quantity would be required for my purpose, and failing to meet with it in this country, I obtained a supply from a correspondent in New York.

The mode of treatment adopted was extremely simple, viz:—Exhausting the bruised root with boiling water, and evaporating the liquid to a soft extract, which was digested in boiling alcohol so long as anything was dissolved; the greater part of the alcohol was distilled off, and a little dilute nitric acid added to the residue; after standing for a day or two, fine crystals had formed, which were purified from resin and other matter by repeated crystallizations from water, with the cautious use of animal charcoal, always adding a few drops of dilute nitric acid to the liquid, which I prefer to hydrochloric acid; the pure salt finally consisted of fine acicular yellow crystals.

All the known reactions of Berberine were manifested; but in order to place the matter beyond dispute, the following analyses were made. The nitrate, as above described, was crystallized from water to get rid of any possible traces of free acid, dried at a temperature of 212° Fahr., and burned with chromate of lead.

No. 1. 5.002 grains gave 11.032 grains carbonic acid and 2.058 grains water.

No. 2. 5.213 grains gave 11.504 grains carbonic acid, and 2.149 grains water.

	No. 1.	No. 2.	Fleitmann.
Carbon, per cent. . . .	60.15	60.18	60.15
Hydrogen, . . . .	4.57	4.58	4.75

Some of the platinum salt was also prepared, dried at 212° Fahr., and burned with lead chromate.

6.132 grains, gave 9.981 grains carbonic acid, and 1.882 grains water.

10.243 grains, burned with soda lime, gave 4.300 grains ammonio-chloride of platinum; 8.516 grains gave, on ignition, 1.544 grains platinum, which figures correspond with the following percentages:—

		Fleitmann.
Carbon	. . . 44.89	44.44
Hydrogen	. . . 3.41	3.42
Nitrogen	. . . 2.59	2.52
Platinum	. . . 18.13	18.11

These results prove satisfactorily that Berberine occurs in *X. apiifolia*, thus adding another source for this very beautiful alkaloid. The amount present is not large; seven pounds avoirdupois yielded only fifty-two grains of the pure nitrate.—*Lon. Pharm. Jour. May, 1862.*

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#### METALLIC COPPER THE MOST DELICATE TEST FOR SULPHUROUS ACID.

By H. REINSCH.

My last paper on my test for arsenic\* contained the statement that the acid liquid obtained by treating ultramarine with boiling hydrochloric acid, blackens metallic copper; the same result was had with a solution of sulphide of calcium in muriatic acid. This reaction I supposed, at first, to be produced by a peculiar sulphur compound as hyposulphites and sulphites ought to be decomposed by boiling muriatic acid; but a long series of experiments render it certain that it is due to sulphurous acid. This reaction is so delicate that the most minute traces which cannot be detected in any other way, are thus shown.

If a few bubbles of sulphurous acid are conducted into half an ounce of muriatic acid, and two drops of this acid are mixed with twenty ccm. of water and ten ccm. of pure muriatic acid, it will on boiling color copper wire brown, and the wire has after some time the appearance as in the presence of arsenic. In the presence of more sulphurous acid, the wire during the boiling appears deep brown-black, and stains the fingers. Air containing but traces of sulphurous acid, passed through muriatic acid, causes an evident reaction with metallic copper. To detect very minute traces of sulphurous acid, it is advisable to make two experiments, one with pure muriatic acid, in which the copper wire on boiling will show a golden lustre, while in the pres-

\* See page 350 of this Journal.

ence of traces of sulphurous acid, the wire loses its brightness, and turns after some time faint reddish, afterwards grey or brown.

When testing for arsenic it is necessary to bear in mind this reaction of sulphurous acid in the presence of muriatic acid. Sulphuric and muriatic acid frequently contain traces of sulphurous acid, and may therefore lead to mistakes with arsenic. All the sulphur acids containing less oxygen than sulphurous acid, will necessarily produce the same reaction. But while the precipitate by arsenic adheres to the copper, and does not stain the fingers, the deposit produced by the sulphurous acid colors the skin black; the former, on being shaken with a few drops of ammonia, separates in fine scales and leaves the copper bright, which is not the case with the latter.

The most apparent difference in the behaviour of the two precipitates is that towards a boiling mixture of equal volumes of muriatic acid and water, which dissolves the former with evolution of hydrogen, but not the latter, which will retain its black color. The precipitate by arsenic on being thus treated, yields at first a white crystalline ring of arsenious acid, and the copper appears silver-white from a coating of arsenico-copper; on continuing the heating the whole of the arsenic will be volatilized and the copper regains its original color.

Water containing sulphurous acid does not react with copper either on boiling or at ordinary temperature; on the addition of muriatic acid, the reaction takes place. Sulphites behave in the same way. It is remarkable that this reaction is produced only by muriatic acid (probably also by the hydracids of the other halogens.) If sulphuric acid be used no such reaction takes place, but after the addition of a grain of table salt, the copper becomes dim and soon reddish. It seems probable, therefore, that under certain conditions this reaction might be useful for the detection of chlorides; it will at least assist in explaining these phenomena.

This method of recognizing sulphurous acid by copper, is useful for detecting sulphurated hops. One strobile is macerated with water for half an hour, the infusion is mixed with an equal volume of muriatic acid, and the mixture boiled with copper wire; in a few minutes, a faint but evident reaction was ob-

served; while no alteration was observable on treating hops in a like manner.—*N. Jahrb f. Pharm.* xvi. 297

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ON HYDRASTINE, AN ALKALOID OCCURRING  
CANADENSIS.

By J. DYSON PERRINS, F. C. S.

The substance hitherto known as Hydrastin in the Eclectic school of American pharmacy proves to be little more than impure berberine; it therefore appears to me that the term *hydrastine* may, with great propriety, be transferred to another alkaloid, which I have recently observed in *H. canadensis*. I have been acquainted with the occurrence of berberine in this plant for some time past. It was observed in pursuing an inquiry which is still incomplete, and therefore has not yet been published. Dr. Mahla, of Chicago, to whom priority of publication is due, has announced this source for berberine in 'Silliman's Journal,' for January, 1862. I can entirely corroborate his conclusions, and add, that hydrastis proves to be an excellent source for berberine. I have obtained from it four per cent. of the crude muriate.

To obtain the new alkaloid, it is advantageous to bear in mind that berberine is difficultly soluble in the dilute mineral acids, especially in dilute nitric acid, and that hydrastine, readily soluble in acids, is insoluble in alkaline solutions; to prepare it, the mother liquor, largely diluted after the separation of the berberine, may be used: this should be rendered as free as possible from alcohol, and solution of ammonia cautiously added until a precipitate *just begins* to appear and remains constant upon stirring; this consists principally of dark-colored resin, previously held in solution by the excess of acids; then filter, and to the filtrate add a slight excess of ammonia; the hydrastine now falls as a fawn-colored precipitate, which should be collected and washed with cold water. Under the microscope it now presents the appearance of spherical granules, very like wheat-starch. I have observed that this precipitate when pressed between porous tiles, and put aside for a few hours, undergoes a remarkable molecular change, becoming decidedly

crystalline; to purify the substance, dissolve with heat in alcohol of eighty per cent., or perhaps preferably in proof spirit, and filter while hot: upon standing for a few days, the greater part of the alkaloid will crystallize out, more or less colored; to render it quite pure, repeat this treatment with the addition of a little animal charcoal until the crystals are colorless. They are now four-sided prisms, and of great brilliancy, but they lose this transparency after they are dried. The yield is about 1.5 per cent. of the dried root operated on.

Hydrastine contains nitrogen, and appears to be a powerful organic base, combining perfectly with acids, and forming the usual double salts with mercury, gold and platinum. Hydrastine is nearly insoluble in water, but readily soluble in alcohol, ether, chloroform and benzole; indeed, it may be obtained by treating the powdered root in a displacement apparatus with either of the three latter solvents, which are without action upon berberine.

The greater part of the salts of hydrastine appear to be readily soluble in water; so far as I have observed, the phosphate and the iodate are the least so: the carbazotate is not very soluble in proof spirit, and it may be easily obtained in radiating groups of yellow, silky needles, often arranged after the manner of wavelite.

Hydrastine melts to a clear colorless resin at a few degrees above 212° Fahr.

Hydrastine, and especially its soluble salts, have a bitter and acrid taste, followed by a sense of numbness, which is not severe, but nevertheless is well marked; whatever the physiological effects of this alkaloid may prove to be, it cannot, I think, be classed amongst the poisons, as five grains given in solution to a full-grown rabbit produced no other effect than a slight uneasiness, which passed off in the course of an hour or two.

Crystals of hydrastine touched with concentrated nitric acid merely give rise to a yellow-brown coloration, which is not very noteworthy, but with sulphuric acid and an oxidizing agent the result is different; with sulphuric acid and bichromate of potash, or peroxide of lead, a coloration is produced varying from a brick-red to a light but pure crimson, certainly distinct from the deep purple yielded by a crystal of strychnine, but so

nearly allied to the tints sometimes obtained from mere *traces* of strychnine as to render it desirable that this color-test should be remarked upon.\*

The degree of attention just now bestowed upon the American remedies of the Eclectics, is my apology for noticing this alkaloid in the incomplete manner which I have here ventured to do, before I have had sufficient opportunity of studying its composition, or of presenting a formula for the acceptance of chemists. Still, as supplementing the paper of Professor Bentley upon *Hydrastis canadensis*, I hope this notice may not be without interest even in its present form.

[Since transmitting the foregoing paper to the Pharmaceutical Society, I have had, through the kindness of Professor Bentley, an opportunity of seeing an essay on *Hydrastis canadensis*, by Durand, which appeared in the American "Journal of Pharmacy," vol. xxiii. v. 112, (1851.) Durand's examination of this root is not very satisfactory. He appears to have overlooked the presence of berberine altogether, but seems to have obtained crystals, which were probably hydrastine, and noted some few of their properties; yet he says he is in doubt as to their nature, his experiments not being sufficiently conclusive to enable him to pronounce thereon. I was not aware there had been any previous notice of this substance until my attention was called to Durand's Essay by Professor Bentley, and it is remarkable that so promising a body should not have been further examined, during a period of more than ten years.—J. D. P.]  
—*Lond. Pharm. Jour. May, 1, 1862.*

#### THE SARRACENIA PURPUREA, A REMEDY FOR SMALL-POX.

To the Editor of the American Medical Times:—

SIR:—You have by this time, in all probability, heard something of an extraordinary discovery for the cure of small-pox, by the use of "*Sarracenia purpurea*," or Indian Cup, a native plant of Nova Scotia. I would beg of you, however, to give full publicity to the astonishing fact, that this same humble bog-

\* The addition of chlorine water to solutions of hydrastine salts, gives rise to an appearance of blue fluorescence, comparable to that seen in acid solutions of quinine.

plant of Nova Scotia is the remedy for small-pox, in all its forms, in twelve hours after the patient has taken the medicine. It is also as curious as it is wonderful that, however alarming and numerous the eruptions, or confluent and frightful they may be, the peculiar action of the medicine is such that very seldom is a scar left to tell the story of the disease.

I will not enter upon a physiological analysis now ; it will be sufficient for my present purpose to state, that it cures the disease as no other medicine does—not by stimulating functional re-agency, but by actual contact with the virus in the blood, rendering it inert and harmless, and this I gather from the fact that if either vaccine or variolous matter be washed with the infusion of the *Sarracenia*, they are deprived of their contagious properties. The medicine, at the same time, is so mild to the taste that it may be mixed largely with tea or coffee, as I have done, and given to connoisseurs in these beverages to drink, without their being aware of the admixture.

Strange, however, to say, it is scarcely two years since science and the medical world were utterly ignorant of this great boon of Providence ; and it would be dishonorable in me not to acknowledge that had it not been for the discretion of Mr. John Thomas Lane, of Lanespark, County Tipperary, Ireland, late of Her Majesty's Imperial Customs of Nova Scotia, to whom the MecMac Indians had given the plant, the world would not now be in possession of the secret. No medical man before me had ever put this medicine upon trial ; but in 1861, when the whole Province of Nova Scotia was in a state of panic, and patients were dying in the hospitals at the rate of twelve and a half per cent., from May to August, Mr. Lane, in the month of May, placed the "*Sarracenia*" in my hands to decide upon its merits ; and after my trials then and since, I have been convinced of its astonishing efficacy.

The Indian Cup is found in swamps and moss bogs. Its capacious globular receptacles are generally filled with cool, bland water. The Cups are lined with bristles, pointing downwards, that entangle the flies that come to drink, so that few escape drowning. It is a very curious and remarkable family of plants, exclusively North American, and not to be met with west of the Alleghanies. The leaves take the form of a long bulbous tube

or funnel, like the bowl of a tobacco-pipe, terminating with a hood-shaped appendage not unlike an Indian squaw's cap. The flowers, with their hard involuted crenate calyx, and fine sessile segments, like the yellow water-lily, deep crimson stigmata, and corresponding stamina, in form and appearance are very remarkable. All of the tribe inhabit marshy grounds. The "*Sarracenia Purpurea*" is the most common species, and like all the beautiful things of Providence, widely diffused from Hudson's Bay to the State of North Carolina.\* The root consists of numerous short radicles, fibrous and stringy, which, when powdered, have a very faint and agreeable aroma, with a taste very like the willow alkaloid, or salicin. The dose of the medicine—the powdered root—is about a dessert-spoonful, simmered in a pint of water down to half a pint; this is divided into two doses, one taken immediately, the other in six hours; no sugar should be given with it. The only functional influence it seems to have, is in promoting the flow of urine, which soon becomes limpid and abundant, and this is owing perhaps to the defecated poison or changed virus of the disease exclusively escaping through that channel. The "*Sarracenia*," I take reason to believe a powerful antidote for all contagious diseases, lepra, measles, varicella, plague, contagious typhus, and even syphilis, also a remedy in jaundice. I am strongly inclined to think it will one day play an important part in all these. Yours, etc.,

FREDERICK W. MORRIS, M. D.,

Resident Physician of the Halifax Visiting Dispensary.

—*Am. Med. Times*, May 24, 1862.

#### CHLORIDE OF LIME AS AN INSECTICIDE.

In scattering chloride of lime on a plank in a stable, all kinds of flies, but more especially biting flies, were quickly got rid of. Sprinkling beds of vegetables with even a weak solution of this salt, effectually preserves them from the attacks of

\* [The *Sarracenia Purpurea* grows in the swampy lands of New Jersey, and is called the "Pitcher plant," and "Side-saddle flower;" Griffith does not mention it in his "*Medical Botany*." Various southern species exist, and two of these are noticed in the U. S. Dispensatory.—*Ed. Am. Jour. Pharm.*]



caterpillars, butterflies, mordella, slugs, &c. It has the same effect when sprinkled on the foliage of fruit trees. A paste of one part of powdered chloride of lime and one-half part of some fatty matter, placed in a narrow band round the trunk of the tree, prevents insects from creeping up it. It has even been noticed that rats and mice quit places in which a certain quantity of chloride of lime has been spread. This salt, dried and finely powdered, can, no doubt, be employed for the same purposes as flour of sulphur, and be spread by the same means. —*Chem. News, London, from Dingler's Polytechnisches Journal.*

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OILED PAPER, AS AN ECONOMICAL SUBSTITUTE FOR OILED SILK IN SURGICAL DRESSINGS.

During a visit to England and Scotland, in the summer of 1860, I noticed in the Glasgow Royal Infirmary that they used an *oiled paper* as a substitute for oiled silk, in surgical dressings. The article was invented by Dr. McGhie, the Superintendent of the Infirmary, and possesses many advantages besides that of being economical.

The following is the mode of preparation :—Take good “ tissue ” paper, free from holes, as many sheets as may be required ; boiled linseed oil, say one quart ; to which add one ounce sulphate of zinc, and re-boil for an hour or longer. A little bees-wax and turpentine may be added, while the oil is hot. Use a square board, larger than the sheet of paper. Coat the first sheet on *both* sides with a paint or paste-brush ; the rest of the sheets only require to be coated on one side, as the oil strikes through. Place the second sheet on the top of the first, slightly projecting at one end, for convenience of lifting, and so on, *seriatim*. When all the sheets are coated, hang them up to dry in a moderately warm place, for twenty-four hours. When taken down, each sheet may be dusted over with French chalk, which will prevent them from adhering. If sufficient wax and turpentine have been used in the mixture, the chalk dusting will not be needed.

Dr. McGhie, in his pamphlet, claims the following advantages for oiled paper as compared with silk :—

1. *Economy*.—A sheet costs from one to two cents only.

2. *Transparency and lightness*.—Applied over a stamp or other cut surface, when hæmorrhage may be feared, the state of the part can be more readily seen. On account of its lightness, it is particularly useful in covering extensive burns.

3. *Adaptability*.—It can be nicely applied to any part, retaining the form impressed upon it. It is easily torn, while, at the same time, it can be made of any required strength by doubling or trebling it.

4. *Safety*.—The great objection to oiled silk (or even to gutta percha sheeting), is, that the expense tempts us to use it over and over again; and in this way disease is propagated. There would exist no such temptation with oiled paper, as it could only be used *once*, and all risk of contagion in this way would be avoided.—*Boston Med. and Surg. Journ.*, Feb. 20, 1862.

W. S. B.

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#### A NEW TEST FOR MORPHIA.

By M. LÉFORT.

This test is based on the following facts:

1. When organic substances decompose iodic acid, the liberated iodine is generally absorbed by caustic ammonia and the mixture is completely decolorized.

2. Morphia, on the contrary, which is decomposed by iodic acid and thereby colored red or brown, becomes still more intensely colored on the addition of caustic ammonia.

The following experiments show the extreme sensibility of the latter reaction:

An aqueous solution, containing one part of morphia in a hundred is colored dark yellow by iodic acid, which at once changes to a very deep yellowish brown on the addition of ammonia.

A solution of morphia containing one part in a thousand is colored lemon yellow, by iodic acid, and the mixture acquires the color of *Alicant* wine when ammonia is added.

In a solution containing one part in ten thousand, iodic acid produces only a slightly perceptible yellowish color, which however becomes quite apparent when a few drops of ammonia are added.

Instead of adding iodic acid and ammonia to the aqueous or alcoholic solutions of morphia, the author now proposes to obtain the solid alkaloid from the solution, in the following manner. A solution of morphia is placed in a porcelain dish and strips of white filtering paper are immersed in it. These are allowed to dry, and are then again immersed and allowed to dry as before. When, after repeated immersions and drying, all the solution has been absorbed by the paper, the morphia is found in the solid state fixed in the filtering paper, to which nitric acid, perchloride of iron and finally iodic acid and ammonia may now be applied, giving their several peculiar reactions with morphia in a sure and easy manner.—*Md. Col. of Pharm. from Repertoire de Pharm.*

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ON THE CONSTRUCTION OF BASINS AND RESERVOIRS UN-  
ATTACKABLE BY MOST ACID OR ALKALINE LIQUIDS.

By M. H. KALISCH.

Unless by making use of wrought or cast iron (which have the inconvenience of being easily attacked by all acid liquids), it has been found very difficult to construct reservoirs capable of resisting the action of boiling solutions of caustic alkalies.

Most of the materials or luting proposed for this purpose are either much too easily acted on, or are too expensive for application on a certain scale.

The author proposes to line the sides of such stone reservoirs with plates or slabs of *heavy spar* (native sulphate of baryta), and to cement all the joints with a luting prepared in the following manner:—

Digest one part of india-rubber, in small pieces, with two parts of freshly rectified spirit of turpentine, until the mixture becomes perfectly homogeneous, then incorporate with it four parts of powdered sulphate of baryta.

Reservoirs constructed in this way ought to resist not only the corrosive action of boiling caustic alkalies, but most organic or inorganic salts,—for instance, sulphates, chlorides and nitrates of zinc, iron, copper, soluble glass, cream of tartar, &c., and boiling hydrochloric, phosphoric, boracic, oxalic, tartaric, and citric acids, and slightly diluted cold sulphuric acid.—*Chem. News, London, April 12, 1862, from Repertoire de Chimie.*

## PREPARATION OF PURE NITRATE OF SILVER.

BY M. LIENAU.

Attack cupreous silver containing copper by nitric acid; to the solution, sufficiently concentrated, add chlorine water, freshly prepared, which precipitates the silver only. Then wash the precipitate in chlorine water, which prevents the chloride of silver from decomposing under the influence of light, and renders it more speedily soluble in solution of ammonia; when well washed, dissolve it in that liquid, and plunge into the solution a well cleaned copper-wire. As the copper dissolves, the silver is precipitated, and is deposited as a brown powder; the operation is at an end when the wire preserves its brightness after being washed in water.

To render the precipitated silver perfectly pure, it is only necessary to wash it in ammoniacal water.—*Ibid*, from *Archiv für Pharm.*

## ON THE ALTERATION OF TINCTURE OF IODINE, AND THE MEANS OF PREVENTING IT.

BY M. DROPET.

It is known that tincture of iodine does not long preserve its color, a portion of the iodine changing to hydriodic acid. M. Dropet endeavors to show that the hydrogen necessary for the reaction comes from the water, and not, as is supposed by other chemists, from the alcohol. Among other experiments, he has shown that a tincture prepared with almost absolute alcohol, 34 centigrammes out of 3 grammes of iodine, were in eighteen months transformed into hydriodic acid. Another tincture, prepared with the same proportion of alcohol at 95°, lost 41 centigrammes; and a third, with alcohol at 86°, 67 centigrammes. These tinctures were preserved together in a dimly-lighted cupboard. M. Dropet concludes that in making tincture of iodine it would be better, for two reasons, to replace the alcohol at 86° by that of 95°. In the first place, the tincture keeps better; in the second, it is made more quickly, since iodine is much more soluble in concentrated than in weak alcohol.—*Chem. News, London, May 3, 1862, from Repertoire de Pharmacie.*

(Continued from page 184.)

sumes a violet color. Reference must be made to these circumstances in the employment of perchloride of iron. The perchloride of iron itself is distinctly colored yellow in considerably diluted aqueous solutions. On this account, it is necessary to prevent any excess of this solution, as otherwise misconceptions will arise; for example, a blue coloration should be observed, but instead of it a green makes its appearance, because the blue coloration which the substance and the perchloride of iron produce is converted into green by the yellow of the solution of perchloride of iron which has been added in excess. Further, it is always convenient to add a little ammonia to the fluid which has assumed a distinct color with perchloride of iron, to observe the appearances which are thereby developed. The green or blue coloration is changed by perchloride of iron sometimes into a dark violet, sometimes into a black, and sometimes into a red. Thus the presence of two substances can be rendered evident, which behave in a free state quite the same as perchloride of iron.

2. *Perchloride of tin*.—The aqueous solution of perchloride of tin produces no coloration in the watery solutions of many substances, and also no precipitates; on the contrary, in the solutions of other bodies, a characteristically colored precipitate frequently results thereby, sometimes only after the addition of a little ammonia. Frequently, by heating a solution after the addition of perchloride of tin, a precipitation results which contains no longer the original substance, but a decomposition product of the substance combined with oxide of tin.

3. *Protochloride of tin*.—The protochloride of tin, as a powerful agent of reduction, produces, particularly at elevated temperatures, changes of color, which indicate the presence of a body which otherwise might have been overlooked. By this reducing action a colored fluid often results. In many cases the addition of a little free alkali assists considerably the action of the protochloride of tin.

4. *Nitrate of silver*.—By the watery solution of this salt a precipitate of a silver compound, insoluble in water, often results in solutions, particularly after the addition of a little ammonia. Many of these silver salts are almost immediately decomposed under the separation of metallic silver, others only under the influence of a higher temperature. The silver separates thereby sometimes as a shining mirror, sometimes as a pulverulent black mass. This varied behavior of the different constituents of vegetable substances to the solution of nitrate of silver, by the presence and absence of an alkali, permits the employment of this salt likewise for the detection of individual constituents in a mixture.

5. *Acetate of lead*.—The neutral acetate of lead is employed as a watery as well as a spirituous solution; for the latter spirit of specific gravity .825 is used. The majority of organic substances are precipitated by sugar of lead from a watery or spirituous solution. One part of the lead compound, insoluble in spirit or water, dissolves in acetic acid; another

part does not. A part of the lead compound insoluble in water, dissolves in alcohol; on the contrary, a part of the lead compound, insoluble in spirit, dissolves in water. By the decomposition of lead compounds which are precipitated from their watery solutions by alcohol, and by the decompositions of lead compounds which are precipitated from their alcoholic solutions by water, the separation of substances is effected which were contained in the lead precipitates together at the same time. When the decomposition is performed with sulphuretted hydrogen, the sulphuret of lead, like charcoal, retains often one or more of the constituents, while other constituents pass over into the fluid in which the lead compound was diffused before treatment with sulphuretted hydrogen.

6. *Basic acetate of lead*.—In general, what has been stated of the neutral acetate of lead is applicable to this reagent. A number of substances which are not precipitated by the neutral salt, give insoluble compounds by the addition of subacetate of lead to their watery or spirituous solution. As many organic substances which have a great tendency to reduce the oxides of the noble metals, and in combination with alkalies and alkaline earths absorb oxygen from the air, form with lead compounds which are less subject to such changes. Both the lead salts are more suitable, in many cases, than other metallic salts to effect the decomposition and separation of substances. Concerning the basic acetate of lead, it is particularly to be mentioned that it precipitates substances from acid solutions because it saturates the free acid, and is converted into the neutral salt. These substances are *per se* insoluble in the fluid, and are only dissolved therein by the agency of an acid, so that the precipitate may contain substances which do not form compounds with oxide of lead.

7. *Acetate of copper* can be used in many cases as the neutral acetate of lead, but seldom offers any advantage over it.

8. *Sulphate of copper* is employed in the same cases in which acetate of copper or acetate of lead is used, when the presence of acetic acid should be prevented in the fluid, because the sulphuric acid which is here introduced into the fluid by the reagent can be more easily and quickly removed than acetic acid. The application of sulphate of copper for distinguishing grape sugar and milk sugar from gum-cane sugar, and analogous bodies, is, of course, well-known; but I may mention that the *alkaline solution of copper* as a reagent demands great care, because many substances effect a reduction and separation of the suboxide of copper, like grape sugar or milk sugar; on the contrary, other substances have not this reaction.

9. *Chloride of platinum*, and

10. *Bichloride of mercury*.—These salts serve for the detection and separation of organic bases. (For the same object, under certain conditions, infusion of galls, nitro-picric acid, and sometimes sulpho-cyanuret of potassium are employed.)

11. *Carbonic acid, metallic oxides insoluble in water, carbonate of lead, carbonate of silver, carbonate of copper, and basic carbonate of lead.* are often employed for the separation of bodies. *Carbonate of zinc and carbonate of cadmium* are seldom serviceable. Many substances expel the carbonic acid from the carbonates, and form compounds partly soluble and partly insoluble; other substances drive off the carbonic acid quite as little at the boiling heat of water as at ordinary temperatures, whilst some other bodies are able to expel the carbonic acid in the heat, but certainly not in the cold. When, therefore, one or the other of the metallic carbonates named are brought into a solution of different bodies, compounds result partly soluble and partly insoluble, while a part of the organic substance remains dissolved in a free state. Many of the dissolved compounds are precipitated by alcohol from their watery solutions, and others are not, whereby a further separation is rendered possible.

12. *Bisulphites of potash, soda, and ammonia.*—These salts are prepared in solution, as concentrated as possible, by conducting sulphurous acid into concentrated solutions of the corresponding carbonates. They are partly employed to produce, with certain substances, compounds which are easily separated from the other constituents, which are not capable of combining with alkaline bisulphites. This is the case in the separation of the aldehydes from indifferent bodies which possess equal solubility in various fluids with the aldehydes. They are partly used with the co-operation of heat to change individual substances, whilst others remain thereby unaltered. Many substances which possess the same solubility as others, by this change lose their solubility in a fluid, so that the bodies remaining unchanged may now be readily separated from the unaltered ones.

It is necessary, when changes are produced by the action of the materials which afford a solid body by separation from a fluid, to always observe whether the separated substance contains or not sulphurous acid and an alkali. By this it may be concluded whether an insoluble compound, with alkaline bisulphites, results or not. As Knop has shown, many bodies break up by the action of alkaline bisulphites in the heat in a manner analogous to the action of free alkalis and acids in the heat. By this capacity to produce decomposition products, the alkaline bisulphites are quite as useful in investigations as by their capacity to form with many bodies alkaline salts under the expulsion of sulphurous acid, whose oxidation by the oxygen of the air is prevented by the presence of sulphurous acid, as Knop has observed with gallic acid and analogous bodies.

13. *Hypochlorite of lime.*—The chlorinated lime is employed as watery solution which has been separated from the undissolved hydrate of lime by filtration through clean asbestos. With many organic substances it produces characteristic colorations, which are often so very intense that a small quantity of a body can be recognized thereby in the presence of other substances. Lichens contain peculiar crystalline materials, some of which

are remarkably colored by chlorinated lime. With many bodies chlorinated lime produces no coloration. The chloride of calcium admixed has no influence in these reactions.

14. *Bichromate of potash*.—Bichromate of potash acts on many organic substances at ordinary temperatures, on others only at a boiling heat. Many bodies undergo no change at higher temperatures with this salt. By this unequal behaviour of bodies to this oxidizing salt, it is suitable for the detection of many substances. Either changes of color only, or also the separation of precipitates, are thereby observed, which latter consist frequently of a combination of oxide of chromium with a newly-formed product of oxidation. Frequently, peculiar odorous volatile oxidation products are formed, which are readily detected by reagents. When the salt does not act on a solution of one or more bodies even at the boiling heat of water, a little sulphuric acid is then added, by which an oxidation is effected, except in a few cases. Only a few bodies withstand the action of chromic acid, which is rendered free by the addition of sulphuric acid. The experiment with bichromate of potash, as well as with chromic acid, is best undertaken in a retort, or a flask connected with a refrigeratory apparatus and a receiver, to intercept the bodies which are volatile. Salicylic acid, kinone, &c., can be thus easily detected in the distillate. Substances which—as, for example, limonine—withstand the action of chromic acid even at high temperatures, are easily isolated from all other accompanying constituents, which thereby undergo decompositions.

15. *Caustic alkalies, the hydrates of potash and soda, as well as baryta*, are often very serviceable as reagents, partly in the form of an aqueous, and partly in the solid condition. Substances are dissolved by a solution of an alkaline hydrate which are insoluble in a free state in water or spirit; while other substances, insoluble, *per se*, but dissolved in the form of a compound, are separated and precipitated by the alkaline solution. Potash, soda, and baryta, effect changes by bodies being heated in their solutions, which often afford conclusions on the nature of the bodies, and quite as often draw attention to the existence of a body which otherwise had remained unobserved. Ammonia, methylamine, and similar bases, are often thereby set free from nitrogenous bodies, sometimes affording a decomposition product which, with the alkali, forms an insoluble compound which separates. This takes place more frequently with baryta, than with soda, or potash. Indeed, often no such insoluble compounds result, but a soluble salt of a decomposition product is formed, which is, *per se*, insoluble in water, so that only after saturation with an acid a decomposition product is separated. As organic substances in contact with the air more readily take up its oxygen in the presence of strong bases than happens without the agency of these bases, it is necessary to exclude the air when the action of alkalies on organic substances is to be observed. Consequently, the bodies are heated with alkalies in vessels which are filled with



hydrogen gas, in the manner explained in the treatment of certain bodies with baryta (page 42.)

The disposition of many organic substances to oxydize with oxygen in contact with alkalis, can likewise be used for the detection of bodies. In these processes of oxidation changes of color generally appear which are not easily overlooked,

16. *Ammonia*.—In its method of action, ammonia is closely allied to the bases above mentioned. In many cases it possesses a preference over them, in so far as an excess of it can be easily removed. Its action is generally less energetic than that of the fixed alkalis and baryta. Ammonia frequently acts in a peculiar way on organic substances, for many organic substances combine therewith under the absorption of oxygen and the separation of water, and produce sometimes brilliantly colored compounds. In contact with many compounds, ammonia produces immediately characteristic colorations. The treatment of dry substances with dry ammoniacal gas, sometimes at ordinary and sometimes at higher temperatures, serves frequently for the detection of bodies which would otherwise remain unobserved, and for the recognition of bodies in other respects similar.

17. *Nitric acid*.—The acid acts in a concentrated condition very vehemently on almost all organic bodies. Their oxidation products, or substitution products, which contain  $\text{NO}_4$  in the place of hydrogen, are thus produced. The body often splits up, and the products of this decomposition then undergo further changes. By the action of nitric acid many bodies assume very intense characteristic colorations, others do not; so that this acid can be used by this property for the recognition of bodies in mixtures with others. Nitric acid mixed with sulphuric is particularly suitable for the development of nitro-compounds.

18. *Sulphuric acid* is employed in a diluted as well as a concentrated condition. The heated dilute acid splits up many bodies into decomposition products, although in this respect hydrochloric acid is much to be preferred. But it may be more readily and quickly separated from a liquid than hydrochloric acid, which in many cases demands care. In a moderately concentrated state it precipitates many forms of tannin from concentrated aqueous solutions, particularly when no acetic acid is present. It gives crystallizable salts with many organic bases, which, with the exception of the salts of methylamine, are soluble in alcohol. The dilute acids often effect in the heat, with some organic substances, an absorption of water, or rather of its elements; with others, an expulsion of hydrogen and oxygen in equal equivalents. In this respect its action has much resemblance to the action of alkalis.

The concentrated acid dissolves many organic substances without exercising any influence on their composition. When the substance is insoluble in water, it is often precipitated unchanged from such solutions by

water. Sometimes the solutions even of colorless bodies are strongly colored. Generally, the color of the solution appears red; more seldom, violet or blue. The yellow or brownish-yellow color is quite as frequent as the red. By the addition of water a more or less complete decolorization then generally ensues, with or without the formation of a precipitate. Sometimes, by the solution of a substance, a so-called copulated sulphuric acid is produced, which is found when the solution, diluted with water, is mixed with carbonate of baryta, lime, or lead, and the sulphuric acid salt, insoluble in water, separated by filtration from the fluid, which is then evaporated, whereby the salt of the copulated acid is left behind.

19. *Hydrochloric acid*.—The concentrated acid precipitates many organic substances from their aqueous solutions, but the precipitation is not generally so complete as that with sulphuric acid. More of the substance to be precipitated remains dissolved in the hydrochloric acid solution than is the case with the use of sulphuric acid. Acetic acid prevents generally the precipitation more or less, and sometimes entirely. The tannic acid of galls, and other analogous bodies, may be precipitated by hydrochloric acid. The dilute hydrochloric acid, at the boiling heat of water, splits up bodies, and in this respect it is not surpassed by any other reagent. Decompositions of this kind are most suitably undertaken in an atmosphere of carbonic acid. A more thorough decomposition, as happens so readily with sulphuric acid at the margin of the liquid, is not to be feared with hydrochloric acid. Hydrochloric acid affords with these decomposition products very little occasion for the formation of bye-products. Through the separation of a difficultly soluble or insoluble decomposition product, and by the peculiar color of many such products, the means are given frequently to recognize and to direct attention to a body. Concentrated hydrochloric acid, as well as hydrochloric acid gas, like concentrated sulphuric acid, produce often a conspicuous coloration of bodies, which sometimes disappears on the addition of water, but sometimes is only slightly changed thereby, and in a few cases undergoes no alteration at all. Hydrochloric acid gas may be employed for the determination of the atomic weights of substances with which it combines; as, for example, organic bases and many hydrocarbons, of which some give therewith a crystalline, and others a volatile compound. In the latter case, hydrochloric acid may be employed for the separation of several such indifferent bodies. Hydrochloric acid is consequently the most generally applicable means for the recognition and separation of organic materials.

Before I pass to another reagent, I will only just remark, that different organic substances which are split up by hydrochloric acid require an unequally long time for their decomposition, so that, by a gentle heat and a sufficiently diluted acid, one of the compounds is often entirely decomposed before the decomposition of the second has begun. In this way, consequently, it is frequently possible to recognize two substances mixed with

one another whose solution could easily have been regarded as the solution of a single substance.

20. *Peroxide of lead, and peroxide of manganese.*—Both these superoxides, in a finely divided condition, frequently produce an oxidation of one or the other constituent in the heated watery solutions of substances, while some bodies are not thereby attacked. A few organic compounds withstand this oxidizing agent after the addition of dilute sulphuric acid. Volatile bodies are often thereby formed, as formic acid, kinone, &c., and frequently characteristically-colored oxidation products; as, for example, with strychnine. The formation of colored oxidation products from many organic bases, which are produced by the action of peroxide of lead and sulphuric acid, depends, with the majority of these substances, upon an illusion. Quinidine, cinchonidine, morphine, &c., result, by the action of sulphuric acid and peroxide of lead, from the bases concerned, only when the sulphuric acid or the peroxide of lead is contaminated with nitric acid. By the employment of pure reagents other decompositions are produced.

21. *Chlorine, bromine, and iodine.*—These three elements produce, partly by the indirect oxidation of the substance in the watery solution in which they are introduced, and partly by the substitution of hydrogen which they call forth, characteristic appearances of color, or precipitations of insoluble oxidation or substitution products; consequently, they serve often for the detection of substances in mixtures.

22. *Gelatin.*—Solution of gelatin is employed for the precipitation of the different forms of tannin. A pure solution of gelatin is prepared by precipitating a solution of gelatin, to which a little hydrochloric acid has been added, with alcohol, washing the precipitate with spirit, and dissolving the washed gelatin in water.

23. *Infusion of galls* serves for the precipitation of organic bases, as well as for throwing down some albuminous substances from their solutions.

The employment of reagents will never lead to a complete knowledge of the composition of a vegetable substance, because, from the similar behaviour towards some reagents of a body discovered with one already known, no conclusion can be drawn on their identity. Reagents are serviceable for directing attention to the presence of substances, and reagents should show us the way of separating bodies which exist in a mixed state. In the second section it has been explained how we are to proceed with different decoctions and infusions of a material under examination, to separate up to a certain point the constituents from one another. Thereby it was necessary to speak of the application of some reagents. The description of the method of separating mixtures was often interrupted, and it was there stated that the further examination must be continued with the aid of reagents. If we had described in every case the method to its termination, a numberless quantity of repetitions would have been un-

avoidable. Besides, that which has been indicated above concerning the individual reagents, clearly shows in what manner and to what purpose each reagent shall be used, where in previous paragraphs it has been only briefly pointed out that reagents should be used for the further investigation. Assuming that by treatment of the precipitate with acetic acid, which sugar of lead produced in the watery decoction of the material under examination, we have the precipitate separated into a part soluble and a part insoluble in acetic acid, the part soluble in acetic acid precipitated by subacetate of lead into two portions, because by subacetate of lead a precipitate results when the fluid still reacts acid, while a second precipitate makes its appearance when the acid fluid is neutralized by the addition of subacetate of lead: assuming that by treatment of both lead salts with alcohol, we have separated them into a part soluble and a part insoluble in alcohol, and thus obtained four portions of lead salts of the precipitate from the part soluble in acetic acid produced by sugar of lead in the watery decoction of the material under examination; assuming that we have decomposed the part of this precipitate insoluble in acetic acid under water by sulphuretted hydrogen, the fluid filtered from the sulphuret of lead, freed from the excess of sulphuretted hydrogen, and thrown down ten lead salts by fractional precipitation with sugar of lead, we have prepared in this way fourteen lead salts from the single precipitate thrown down by sugar of lead in the watery decoction of the material under examination. By the decomposition of these lead salts with sulphuretted hydrogen, we have fourteen aqueous solutions, which are now to be tested with reagents. It is self-evident that certain reagents are not here required to be employed, because no representative can be contained in these fluids of the class of bodies for which they could be used with results. We have found in the precipitate produced by sugar of lead partly inorganic and partly organic acids combined with lead, no indifferent carbohydrates and no bases, because their precipitation is prevented by the acetic acid rendered free. The vegetable acids existing generally as malic acid, citric acid, tartaric acid, fumaric or aconitic acid, the tannic acids, the acids corresponding to gallic acid, substances which are so widely spread in the vegetable kingdom, are contained in this precipitate, by the investigation of the bark, the leaves, the stems, and the flowers of plants. Coloring matters, often formed by the oxidation of the various forms of tannin or their splitting up, are produced from colorless bodies. Gelatinous bodies of the class of pectine compounds are frequently present in this precipitate. Coloring matters and pectine bodies, by the decomposition of the lead compound with sulphuretted hydrogen, are often entirely retained in the sulphuret of lead, partly because sulphuret of lead acts analogous to animal charcoal, and partly because they were present in the watery decoction in the form of soluble salts. By precipitation with sugar of lead the base of the soluble salt is separated as an acetate, the acid precipitated with the oxide of lead, and retained by the sulphuret of

(To be continued.)

## Varieties.

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*Waterproof Glue.*—Fine shreds of india rubber, dissolved in warm copal varnish, make a waterproof cement for wood and leather. Take glue, 12 ounces, and water sufficient to dissolve it; then add 3 ounces of resin, and melt them together, after which add 4 parts of turpentine. This should be done in a water bath, or in a carpenter's glue-pot. This also makes a very good waterproof glue.—*Lond. Chem. News.*

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*New Substitute for Silver.*—M. Traluc, of Nismes, has recently proposed as a substitute for silver for various uses, a white alloy which has the property of resisting vegetable acids. It is formed of 375 parts of Banca tin; 55 nickel; 50 regulus of antimony; 20 bismuth. One-third of the tin is put in a crucible of the proper dimensions with the nickel, antimony, and bismuth; upon this first layer is put another third of the tin, and then a thickness of an inch and a half of wood-charcoal; the crucible is then to be covered and brought to a white-heat; by means of an iron rod also heated to redness it must be ascertained that the nickel is fused, and the antimony reduced; the remainder of the tin is then introduced through the charcoal, and the mass stirred until the metals are thoroughly combined; it may then be cast in ingots or otherwise.—*Cosmos.*

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*Durability of Hemlock.* By T. Guilford Smith, C. E. M. and B. M. Railroad.—In laying pipes to supply a water station on the top of the Broad Mountain, in Schuylkill County, on the line of the Mahanoy and Broad Mountain Railroad, we found it convenient to make use of the dam, and to follow the ditch originally made by the Danville and Pottsville Railroad Company, 32 years ago.

To our surprise, we found the hemlock trees which had been bored for pipes, in a perfect state of preservation, wherever submerged or surrounded by moist earth. The bark was still adhering, and the sapwood presented that rosy hue seen in freshly felled hemlock. Wherever, on the contrary, the surroundings were dry, the timber was decayed.

The pipes varied in depth beneath the surface of the ground from  $1\frac{1}{2}$  to 2 feet. They were in excellent condition for over 1000 feet in a continuous line.—*Journal of the Franklin Institute.*

## AMERICAN PHARMACEUTICAL ASSOCIATION.—NOTICE.

The adjourned meeting of the Association, which was to have been held last year at St. Louis, and postponed in consequence of the disturbed condition of the country, will be held at the City of Philadelphia, on Wednesday the 27th of August next, at 3 o'clock, P. M.

It is most earnestly recommended to *all* the members to keep in view the important interests of the Association—to the several Committees, and especially those members and others appointed at the meeting held at New York, in 1860, to whom was referred the investigation of special subjects, to be ready to make their reports at the coming session of the Association.

The objects of the Association and the conditions of membership are explained in the *first and second articles* of the Constitution as published in the Proceedings of 1860, and in the several Pharmaceutical Journals.

H. T. KIERSTED, *President*.

*New York, April 12th, 1862.*

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## Editorial Department.

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NEXT MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.—At the meeting of the Board of Trustees of the Philadelphia College of Pharmacy, in May last, the following resolution was passed :

“Resolved, That a committee of five be appointed to make arrangements for the meeting of the American Pharmaceutical Association in August next, and that they be requested to correspond with the Pharmacutists of neighboring cities and towns in Pennsylvania, New Jersey, Delaware and Maryland, inviting their attendance, and to advertise the meeting in the papers of this city, and report to a future meeting of this Board the probable expenses attending the Convention.”

The following committee was appointed :

WM. PROCTER, JR., 500 South 9th street,  
EDWARD PARRISH, 800 Arch street,  
A. B. TAYLOR, 1015 Chestnut street,  
EVAN T. ELLIS, 724 Market street,  
JAMES T. SHINN, Broad and Spruce street.

From the Minutes,

A. B. TAYLOR, *Secretary*.

The Committee of Arrangements are about to engage in the duties of their appointment, and the residence of each member of the committee has been indicated in order that strangers who may come to this city with the view of attending the meeting, may know where to apply for information, and they are invited to do so freely to either of the committee.

It has been determined to convene the meeting in the College Hall,

Filbert street above 7th, and as our readers will notice in the call of the President at page 378, it will occur at 3 o'clock, on the afternoon of Wednesday the 27th of August.

This location is central and convenient to the principal hotels, being about three squares from the Continental, 9th and Chestnut streets. All persons intending to become members by the action of the Association at its first meeting, are each requested to make application to the Chairman of the Executive Committee, (W. Procter, Jr., as above,) and get a copy of the Constitution with accompanying blanks for signature, either before hand or when they arrive in Philadelphia. We are authorized to say that arrangements will be made for the exhibition of specimens at the meeting, and all persons intending to forward specimens should direct their packages (freight paid) to the Philadelphia College of Pharmacy, care of Edward Parrish, 800 Arch Street, Philadelphia.

**REPORT OF THE REVISING COMMITTEE ON THE BRITISH PHARMACOPOEIA.**—This Committee were appointed by the "General Medical Council," a body holding their authority directly from Parliament. This Committee commenced their labors in November, 1858, and made a partial report, which was published at page 430, vol. xxxii., (1860) of this Journal. They now announce the completion of their labors so far that the manuscript copy of the British Pharmacopœia is ready for the printer. The work contains 322 articles of the materia medica list, 380 processes, galenical and chemical, and 49 substances in an appended list. To give an idea of the labor expended in producing this work, the report says: "The London sub-committee met 149 times; that of Edinburgh 105 times; that of Dublin 131 times; and the general conferences of the three committees held in London and Edinburgh met ten times, whilst a sub-committee on the chemistry of the work met in Dublin eighteen times. The weights adopted for the work are the avoirdupois, pound and ounce; the latter divided precisely as the troy ounce into 8 drachms, 24 scruples, and 480 grains, which reduces the grain about 1-11th in value. The British Pharmacœutists may well rejoice in being relieved by this change from the onerous task of unceasingly bearing in mind that the weights they employ in buying and selling are *not* those they must use in compounding medicines; and this change is to be brought about without the alteration of a single term in their metrological nomenclature. We have always been favorable to the adoption of this system in the U. S. Pharmacopœia, on the ground both of its expediency and real merit, as a measure giving uniformity of action among apothecaries, many of whom pay no regard to the use of troy weights in compounding quantities greater than half an ounce, because they have only avoirdupois weights.

The delay which now prevents the publication of the work has reference to the copyright, which required the action of the general council

and it is proposed to obtain an act of Parliament rendering the use of the new Pharmacopœia obligatory on all engaged in the preparation of medicines, for regular practitioners, within the British Empire.

In regard to the numerous changes in the strength of preparations consequent on a fusion of the three British Pharmacopœias, the committee deem it necessary "to publish a warning to all pharmaceutic chemists and druggists, that, on the publication of the Pharmacopœia it will be impossible for them to discharge their duties to the public safety unless they destroy or alter all pharmaceutic preparations they may have in store which have been made according to present formulæ, and the strength of which is altered in the new Pharmacopœia. And a further caution must be given to all medical practitioners, that it will be hazardous for them to exercise their profession without making themselves acquainted with all changes made in the strength of official preparations, which changes will be carefully noticed under each article."

It is greatly to be desired that this work should be published early, that our own revised Pharmacopœia, which is rapidly being fitted for the press, may be benefitted by any valuable suggestions it may offer, and may be modified in those instances where important preparations of the same name may vary but slightly from that authority.

**PRICES OF DRUGS AND CHEMICALS AT THE SOUTH.**—The following letter from Dr. Bahe, Surgeon of General Butler's Expedition, to the Editor, was received just as we were going to press, and is inserted here as a curious matter of history. It is presumed that the prices mentioned have reference to Confederate notes, and not to U. S. Currency.

*Head Quarters, Department of Gulf, June 12th, 1862.*

*My dear Sir,*—You have probably heard many wild stories concerning the prices of drugs lately sold in this city (New Orleans.) As an interesting piece of information, I have taken care to get at the truth, and enclose the statement to you:

Chloroform per pound	.	.	.	24.00 dollars.
Opium " "	.	.	.	35.00 "
Calomel " "	.	.	.	6.00 "
Maas Pil. Hydrargyri, per pound,	.	.	.	6.00 "
Magnesiæ Sulphas " "	.	.	.	0.75 "
Ether " "	.	.	.	2.50 "
Alum " "	.	.	.	0.75 "
Potassii Iodidum " "	.	.	.	20.00 "
Tannin " "	.	.	.	40 to 50.00 "
Sulphate of quinia per ounce	.	.	.	10.00 "
Sulphate of morphia " "	.	.	.	16.00 "
Castor oil per gallon	.	.	.	12.00 "

One apothecary told me he is sure there was plenty of quinia sulph. in the Confederacy, about 4500 ounces. That he knew of one person who recently had about 1000 ounces.

The prices above, refer to the period before our arrival.

Yours truly,

T. H. BACHE.



**MERCANTILE LIBRARY.**—We are gratified to acknowledge the following liberal invitation from the Mercantile Library Company:

*Philadelphia, June 10th, 1862.*

To the Proprietors of the American Journal of Pharmacy.

*Gentlemen,*—Enclosed you will receive with the compliments of the President and Directors of the Mercantile Library Company, a ticket for the editorial corps connected with your office, extending to the bearer of the ticket the freedom of the library rooms for the year 1862, according to a resolution passed by the Board.

J. H. WILSON, JOHN D. WATSON, T. MORRIS PEROT, Committee.

*Baltimore, June 20th, 1862.*

Editor of the American Journal of Pharmacy.

*Sir,*—At a meeting of the Maryland College of Pharmacy, held June 5th, the following gentlemen were elected delegates to the American Pharmaceutical Association, which meets in Philadelphia August 27th:

J. J. Thomsen, J. Faris Moore, N. Hynson Jennings,  
Jonas Winter, J. Brown Baxley.

Respectfully,

J. JACOB SMITH,  
Secretary of the Maryland College of Pharmacy.

**ALCOHOLIC TINCTURES.**—The following query has been received:

*Philadelphia, June 14th.*

To the Editor of the American Journal of Pharmacy:

*Sir,*—I have sought in vain for some information as to whether alcoholic tinctures are deteriorated by the precipitation which takes place in some of them after standing for several years. Will you please inform me through the Journal how it is, and if deteriorated, whether to any serious extent?

Respectfully,

APPRENTICE.

In reply it may be stated that many of these preparations do deteriorate by age. The causes of injury are various; the reaction of incompatible ingredients which find themselves in the presence of each other through the agency of the menstruum, and gradually produce a new arrangement of proximate constituents. The action of light as a chemical agency is very fruitful of changes, and when the aid of atmospheric oxygen is added, we have the chief cause of the deterioration of tinctures. It is well known that diluted alcohol becomes acetic by exposure to the air, and Mr. Bastick (see American Journal of Pharmacy, vol. xx. page 47,) has remarked on this tendency in tinctures. Tannin reacts on alkaloids, on standing, in the cinchona tinctures, (see Maisch, same work, May 1861, page 194), and we are all familiar with the destruction of the tannic acid in astringent tinctures of the kino class, resulting in a gelatinous apothemic precipitate. Messrs. De la Rue and Müller have (see same work, July, 1858, pages 366 and 442,) examined the deposit in tincture of rhubarb, and,

found it to consist chiefly of erythreotin, crysophanic acid, and other active constituents of that drug. It may be inferred from what is known, that tinctures keep best carefully closed, and in the dark. Our space will not admit of further comment.

**THE TAX BILL FOR INTERNAL REVENUE.**—This measure, we learn on going to press, has become a law, and the 106th section bearing on apothecaries appears to have passed very much as printed in our May number at page 282, as recommended by the College Committee, except the last clause in parenthesis, which was omitted. We have been unable, by diligent inquiry, to get information on many points of interest in connection with the operation of the law, as to when it will *practically* go into effect, how it will operate on stock on hand, etc., but we presume the government will take the proper measures to publish the whole law in a clear and explicit form, so that all may understand their relations with it.

**UNG. CADMII IODIDI.**—Mr. Charles Heinitch, of Lancaster, says, that the ointment of iodide of cadmium is getting considerably into use in that city as a substitute for the official Ung. Potassii Iodidi, because it does not discolor the skin. He recommends the following formula:—

R. Cadmii Iodidi . . . . .	℥j.
Adepis . . . . .	℥j.
Ol. Neroli . . . . .	gtt. x.
Ætheris . . . . .	gtt. xx.

Rub the iodide with the ether, till in fine powder, then add the lard and oil, and thoroughly mix them,

**AMERICAN MEDICAL ASSOCIATION.**—The annual meeting of this body, postponed last year on account of the rebellion, is further postponed until June, 1863, by order of the Committee of Arrangements, dated Chicago, March 20th, 1862, as noticed in the *Chicago Medical Examiner*.

**ERRATUM.**—In our last number, page 241, line 18 from the top, the printer made us use the word "Anatomy." The intelligent reader would at once from the context discover that it should be "Antimony."

*First Outlines of a Dictionary of the Solubilities of Chemical Substances.* By Frank H. Storer.

The first eight pages of a work with this title, has been sent to us. From the range of words as exhibited in the specimen, the work, if carried out in the same way, will be very comprehensive. Such a work, if correct, will be exceedingly valuable, but much will depend on the care of the author in sifting authorities, as in no character of chemical substances do writers more often disagree than in that of solubility. We observe a great

many substances simply named without any reference to solubility. This is probably as a reminder for a future edition. We would encourage the author to proceed with the work, and to be as explicit as possible in stating solubilities as to proportions of solvent, temperatures and time, inasmuch as some very soluble bodies dissolve very slowly.

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*On the Economic Applications of Sea Weed.* By Edward C. C. Stanford, F. C. S. 15 pp. large octavo. (Reprinted from the Journal of the Society of Arts, Feb. 1862.)

The receipt of the above pamphlet from the author is hereby acknowledged, and we hope to make some extracts of interest to our readers in a future number of this journal. The most important feature of this paper is a new way of treating sea weed to get kelp, by which various collateral products, heretofore lost, can be obtained.

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*The Industrial Chemist.* Devoted to the interests of practical Science, Arts, Manufactures, Agriculture and Industry in general. Edited by Professor H. Dussauce, of New Lebanon, New York. Published monthly, by John Hillyer, 249 Pearl St. New York. Price \$1.50 per annum. Vol. 1, No. 1, pp. 16,—large quarto.

This work is intended as a vehicle for conveying information in regard to Science and Art to its readers, and judged by the variety presented in the first number, the prospect is a fair one. We hope the Editor, as far as possible, will adopt the honest and fair practice of crediting his selected articles to the Journals or authorities whence obtained, not only in justice to writers, but greatly to the satisfaction of investigators who may wish to consult the originals. As an instance of this want of care, the Journal and Transactions of the Maryland College of Pharmacy, in April, 1862, re-published Dr. Pile's letter to the Editor of this Journal, from our January number, without credit, appearing to all intents and purposes as addressed to the Editor of the Maryland Journal. The Journal of Materia Medica, for May, copies it, and credits the Maryland Journal, and thus the original source of the article remains unknown to its readers.

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*On Bandaging and other operations of Minor Surgery.* By F. W. SARGENT, M. D., Member of the College of Physicians of Philadelphia, &c. New edition, with an additional chapter on Military Surgery by W. F. Atlee, M. D., and one hundred and eighty-seven illustrations. Philadelphia, Blanchard & Lea, 1862. pp. 383 octavo.

The volume of which the above is the title page, is not intended for the Pharmaceutist, but, like many other medical and surgical works, there are many hints to be gleaned from it which may contribute to extend his usefulness on many legitimate occasions in his intercourse with the public.

The second chapter is devoted to "surgical dressings," which describes

"lint, charpie, cotton, compresses, sponge-tent, adhesive plasters, collodion, poultices, lotions, cerates, ointments, liniments, and sponge." Of lint the author says, "The French surgeons employ an admirable sort of lint, which they term 'Charpie.'" It is now very generally used in this city, and, indeed, throughout the country when it can be procured. It is thus made :—"Linen of a coarse or fine texture, according to circumstances, is cut into small pieces a few inches square, and its tissue completely unravelled, thread by thread. The coarse kind of charpie may be made of old table cloths; the finer sort, of a lighter material. Velpeau gives a decided preference to charpie made of old linen, as being much more absorbent, and much less irritating than that made of the new fabric."

The remarks on poultices, bandages, disinfectants, fumigations, topical bleeding, including, cupping, leeching rubefacients, vesicants, moxas, and other cauteries, the means of stopping hæmorrhage, injections, the removal of solid bodies, the air passages, and the production of anæsthesia for the relief of pain, are well worthy of study by the apothecary, who, in his relations to the public and to physicians, is often called on for information embraced within these subjects, and we believe Dr. Sargent's book will prove a useful addition to the library of the pharmacist, who aims at accomplishing himself in all the details of his profession.

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*Report of the Surgeon General of the Commonwealth of Pennsylvania, for the year 1861*, has been received. It is a small pamphlet of 11 pages, and gives an account of the organization of the State Medical Corps attached to the regiments put in the field or camp last year.

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*Retrospect of Practical Medicine and Surgery*, being a Half-yearly Journal, containing a retrospective view of every discovery and practical improvement in the medical sciences. Edited by W. BRAITHWAITE, M. D., and J. BRAITHWAITE, M. D. Part xlv. January, 1862. Uniform American edition, New York, published by W. A. Townsend, 1862. pp. 382, octavo.

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OBITUARY.—PIERRE BERTHIER, the oldest of the French Mineralogists, died of paralysis on the 29th of August, 1861, aged 89 years. He was born at Nemours, July 3d, 1772, entered the Polytechnic School, and afterwards the School of Mines, which he left in 1801. His early and celebrated work, "*Traité des Essais par la Voie Sèche*," gave him reputation, and proved of great service to metallurgy and analysis, and led to his appointment as a Professor in the School of Mines, a position which he retained until 1845.

JOUBARD.—This noted advocate of the rights of intellectual property died at Brussels, Oct. 26, 1861, aged 79 years. He was born at Baissey, a village in the department of Haute-Marne, in 1782. He was Director of the *Musée de l'Industrie*, created after Belgium separated from Holland, 1830. —(*J. Nickles, Corr. Sill. Jour.*)

THE  
AMERICAN JOURNAL OF PHARMACY.

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SEPTEMBER, 1862.  
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CHEMICAL EXAMINATION OF THE BARK OF THE ROOT OF  
EUONYMUS ATROPURPUREUS.

BY WM. T. WENZELL.

*Physical Characters.*—The bark is of a whitish color, excepting the epidermis, which is streaked with black, is easily pulverized, giving a mealy powder. The parenchymatous tissue cut into thin sections was found to be composed of pentagonal cells running longitudinally with the root, and filled with numerous starch granules. These granules were found on comparing with measured starches to vary from  $\frac{1}{10,000}$  to  $\frac{1}{5000}$  of an inch in diameter. Their form was spherical, apparently somewhat flattened, the hilum occupying the centre, with its concentric rings just visible, with a magnifying power of 400 diameters.

*Preliminary Examination.*—A cold infusion of the bark is not changed by perchloride of iron, it is rendered turbid by heat, is precipitated by bichloride of mercury and infusion of galls. Acetate and subacetate of lead give copious precipitates. phospho-molybdic acid gives a precipitate. Trommer's test indicates *Glucose*.

An alcoholic tincture deposits on spontaneous evaporation a substance like wax, soluble in ether and chloroform, but insoluble in alcohol. The tincture is precipitated by salts of lead.

A decoction is colored blue by iodine, and if concentrated deposits crystals.

*Course of Analysis.*—A quantity of the bark was percolated with 95 per cent. alcohol, and the resulting tincture set aside for future examination. The bark exhausted with alcohol, after being dried, was subjected to the action of cold water by per-

colation. The solution thus obtained was heated and filtered to separate albumen, and evaporated to a semi-syrupy consistence, when a granular whitish deposit took place. This deposit was sparingly soluble in water, very soluble in dilute nitric and hydrochloric acids; a portion of the nitric solution tested with oxalate of ammonia gave indications of lime, and gave precipitates with nitrate of silver and chloride of barium. Acetate of lead gave a precipitate very soluble in citrate of ammonia, but insoluble in ammonia. Its hydrochloric solution treated with ammonia and boiling, gave a precipitate, which, on dissolving again in the acid, and treating as before, caused again a precipitate. The granular deposit was therefore *Citrate of Lime*.

The solution, after separation of citrate of lime, was diluted with water and then treated with acetate of lead as long as a precipitate was obtained. The washed precipitate suspended in water, was decomposed by a stream of hydrosulphuric acid. The acid solution which was obtained, on being neutralized with ammonia and mixed with chloride of calcium, afforded a precipitate of *tartrate* of lime, recognized by its behaviour towards solutions of soda and potassa, and by the sparingly soluble salts of potassa and ammonia. To the filtrate after the separation of tartrate of lime, more chloride of calcium was added and mixed with an excess of alcohol, when a bulky precipitate subsided. This precipitate was dissolved in acetic acid, and again precipitated by acetate of lead, to which a little ammonia was added, and the washed precipitate decomposed as before. One half of the acid solution evaporated to dryness, and heated in a glass tube, first melted and then decomposed with the formation of a crystalline sublimate, which possessed strong acid properties, very soluble in water and alcohol, precipitated by acetate of lead and barytic water. The other half of the solution was divided into two equal parts, one of which was exactly neutralized with ammonia and evaporated, when it was left as a deliquescent uncrystallizable salt. On dissolving the salt again in water, and adding the other remaining half of the acid, a less soluble bi-salt, consisting of acicular crystals is obtained. The acid under examination is therefore *Malic Acid*.

The liquid, after the action of neutral acetate of lead, was treated with subacetate of lead, and the washed precipitate de-

composed as before. The liquid obtained possessed a strong acid reaction, and deposited on boiling oblique prismatic crystals, which, on examination, proved to be a salt of lime. This salt of lime after solution in water was again treated with acetate of lead and again decomposed. A portion of the acid solution now free from lime, on being mixed with ammonia and chloride of calcium, and boiling, produced no change; on mixing, while yet warm, with 95 per cent. alcohol, after a short time, crystals were formed. These when examined by the microscope were shown to be long, thin, needle shaped, and curved, unalterable in air, and very soluble in water. The acid solution, on being evaporated and allowed to stand in a warm place, crystallized in beautiful prismatic crystals. It is to be regretted, that owing to the limited quantity of material at command, the chemical properties of this new organic acid could not have been more thoroughly investigated. This acid may be called *Euonic Acid*.

The solution remaining after the action of the subacetate of lead was freed from lead by hydrosulphuric acid, and passed through prepared animal charcoal, and then placed in a warm place for spontaneous evaporation, when in due time a crystalline deposit was obtained. This deposit was dissolved in water, and the solution treated with twice its volume of 95 per cent. alcohol; and the precipitate which fell collected on a filter and washed with alcohol. The precipitate was acted upon by water, which took up a portion of it, consisting of *chloride of potassium* and *sulphate of potassa*, while the insoluble part was found to consist of *phosphate of lime*.

The alcoholic solution, after separating the above inorganic salts was evaporated carefully, adding some water, and set aside for two or three days, when crystallization was effected. The crystals were drained on bibulous paper and dried. They were again dissolved in water and recrystallized. The crystals obtained were colorless rhombohedral prisms, soluble in about 60 parts of water, and freely soluble in boiling water, and neutral to test papers. On mixing its solution with one of ammoniacal acetate of copper, a beautiful azure blue precipitate is obtained. Solution of ammoniacal acetate of lead gives a voluminous white precipitate. On heating the crystals on platina

foil, they first fused, giving off vapors of water, and puffed up into a spongy coal, combustion being effected without residue. When treated with sulphate of potassa in the cold, or boiling with hydrated oxide of lead, combination was readily effected with the evolution of ammonia. On decomposing the compound of lead, the liberated acid, which possessed but little taste, was not precipitated by the salts of lead and silver, and on evaporation it was obtained as a colorless powder, composed of minute prismatic crystals, which yield ammonia on being decomposed by heat. There is no doubt of its identity with *Asparagin*.

The remnant of the solution was evaporated and heated to incineration. The ashes gave on analysis *Lime* and *Magnesia*.

The alcoholic tincture when allowed to evaporate spontaneously, yields an oily substance, from which, when treated with sulphuric ether, the oil is dissolved and a soft resin left. The oil on being purified by washing with alcohol, was left of a yellowish color and bland oily taste, possessing the properties of a fixed oil. The tincture thus freed from the fixed oil and neutral soft resin, was treated with an alcoholic solution of acetate of lead; the washed precipitate suspended in alcohol, decomposed, and the filtrate passed through prepared animal charcoal. The colorless solution reddened litmus paper strongly, and gave, with acetate of lead, nitrate of silver, and barytic water, white precipitates. Ammoniacal sulphate of copper gave a bluish white precipitate. A concentrated solution deposited on the sides of the vessel confused masses of prismatic crystals. The resin is very fusible, burning with bright flames, is tasteless and inodorous, soluble in alcohol, ether and chloroform; a drop of the solution placed under the microscope, and allowed to evaporate, exhibited a group of prismatic crystals, radiating from its central point. It combines readily with alkalis forming salts, very soluble in water. The solution, after the separation of the last resin, was set aside about two weeks, when a deposit formed on the sides of the vessel. This was first malaxated with water, then dissolved in ether, and the ethereal solution evaporated. A resin was left of a golden yellow color, which exhibited no tendency to crystallize, and having an acid reaction. Its solution in alcohol gave with baryta an orange-colored precipitate, sulphate of



copper gave a bluish, and acetate of lead and nitrate of silver yellowish white precipitates. The resin is fusible and combustible. That portion of the deposit not acted on by ether proved to be likewise a resin; it was pulverizable, of a brown color and bitterish taste, and its solution was precipitated by acetate of lead.

The liquid, after the separation of the several resins, was mixed with water in all proportions without causing a precipitate. It gave precipitates with phospho-molybdic acid, and subacetate of lead, and still possessed the bitter taste of the bark. It was evaporated to expel the alcohol, and the aqueous solution passed through prepared animal charcoal, which removed the bitter principle. The decolorized solution was evaporated to a syrupy consistence, when, after a few days' repose, crystals of asparagin were deposited. The liquid also gave indications of grape sugar.

A portion of the bark, after exhaustion with cold water, was treated with a cold and weak solution of carbonate of soda, and the filtrate acidulated with hydrochloric acid without causing any precipitate; another portion of the bark was treated with the solution at a temperature 170° Fahr.; on acidulating a portion of the filtrate, a gelatinous precipitate was obtained; another portion treated with chloride of calcium gave an insoluble precipitate. From this it appears that *pectin*, not pectic acid is present.

One hundred grains of the dried bark gave by incineration 14.75 grains of ashes, 1.19 of which were soluble in water. 5.94 grains were soluble in hydrochloric acid, and gave on analysis, lime, magnesia, oxide of iron, phosphate of iron, and phosphate of alumina. The insoluble silicious residuum was not examined.

A tincture of the bark was prepared with dilute alcohol and agitated with chloroform. The chloroformic solution or layer was carefully drawn off, and allowed to evaporate spontaneously, which left a dark, yellow substance, having the taste of the bark in an eminent degree, reddening litmus paper, very soluble in alcohol and chloroform, but partially soluble in ether. On subjecting it to the action of ether, this dissolved the substance to

which the acid reaction was due, and on evaporation there was left the golden yellow resin already described.

The part left after the action of ether was dissolved in alcohol, and treated with a solution of acetate of lead, to precipitate some other resin, and the filtrate deprived of lead by hydrosulphuric acid. The colorless solution thus obtained possessed an intensely bitter taste. It is abundantly precipitated by subacetate of lead; phospho-molybdic acid caused a flocculent whitish precipitate. It is soluble in water, ether and alcohol, and is not crystallizable. It is a neutral body, possessing neither acid nor alkaline reaction. It is reddened by strong nitric acid, and converted into a substance possessing acid properties. Sulphuric acid dissolves it without production of color. Both acids destroy the bitter taste of the principle Euonymin.

From the foregoing analysis, the bark of *Euonymus Atropurpureus* may be said to contain the following constituents:

*Organic Constituents Uncombined.*—Euonymin, Asparagin, Soft Resin, Crystallizable Resin, Yellow Resin, Brown Resin, Fixed Oil, Wax, Starch, Albumen, Glucose, Pectin.

*Organic Acids in Combination with Lime and Magnesia.*—Malic Acid, Euonic Acid, Citric Acid, Tartaric Acid.

*Inorganic Salts.*—Phosphate of Lime, Sulphate of Potassa, Chloride of Potassium, Sulphate of Lime, Phosphate of Iron, Phosphate of Alumina, Oxide of Iron, Silicious Residue.

*La Crosse, Wisconsin, July 15th, 1862.*

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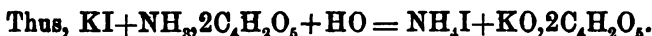
## ON THE PREPARATION OF IODIDE OF AMMONIUM.

BY WILSON H. PILE, M. D.

There are two methods of preparing this article usually given by chemical writers. One is, to proceed as in making iodide of potassium, first forming an iodide of iron, and then by the addition of ammonia, throwing down the sesqui-oxide of iron and leaving the iodide of ammonium in solution. Made in this way, the product is generally dark colored. The second and more preferable method is by first making hydriodic acid and then saturating it with ammonia. The objection in this latter case is the necessity of first preparing the acid, a very disagreeable process, involving the use of sulphuretted hydrogen

gas, which would no doubt deter the generality of pharmacu-  
tists from attempting it.

In the method here proposed, the above objections are avoided,  
and by following the directions a pure salt is easily obtained.  
The formula is based upon the fact of the insolubility of bi-  
tartrate of potassa, which is thrown down when iodide of potas-  
sium and bi-tartrate of ammonia in concentrated solutions are  
mixed together.



The first step of the process is the formation of the bi-tar-  
trate of ammonia; the second, its double decomposition by  
means of iodide of potassium, and finally the separation of all  
traces of bi-tartrate of potassa from the resulting salt.

The detail of the whole process is as follows: Dissolve 300  
grains of tartaric acid in 3 ounces of water, and saturate ac-  
curately with water of ammonia (about 14 fluidrachms.) The  
bi-tartrate of ammonia copiously thrown down at first, redis-  
solves as the solution becomes neutral to a test solution of lit-  
mus; 300 grains more of tartaric acid is now to be added and  
the mixture raised to boiling. A solution of 662 grains of  
iodide of potassium in an ounce and a half of water is now to  
be stirred in, and the boiling continued for a few minutes  
longer; then set aside for several hours, filter, and when all the  
liquid has passed through, pour on the filter 2 ounces or more  
of cold water, until the filtrate has but little saline taste. Now  
evaporate all the filtered liquid until it begins to thicken, and  
while yet warm, pour on a mixture of 2 ounces of alcohol and  
 $\frac{1}{2}$  ounce water; this alcoholic liquid readily dissolves all the hy-  
driodate of ammonia, but leaves a small quantity of cream of  
tartar.\* After being allowed to settle, the clear solution is to  
be decanted off, the residue washed with a little more alcohol and  
water, and finally the whole evaporated at a gentle heat to per-  
fect dryness.

The resulting salt, which while yet moist appears like brown  
sugar, becomes at last nearly white. It is inodorous, very de-

\*In the present case the weight of cream of tartar thus separated  
amounted to 13 grains.

liquescent, and, which is a test of its purity, totally volatilized with decomposition by heat, with evolution of iodine vapors.

The yield of several trials from the above quantities was 545 grains; theoretically there should have been 576 grains. Possibly the iodide of potassium employed was not entirely pure. The collected and pure cream of tartar was about 700 grains.

6

## REMARKS ON UNGUENTUM MEZEREI.

BY RICHARD B. SHERIDEN.

(Extracted from an Inaugural Essay.)

My attention has been directed principally to this preparation, on account of the difficulty which every pharmacist experiences, in endeavoring to prepare it as directed by the Pharmacopœia. The objections to the mode of preparation therein directed, are briefly as follows:—

1. The time required in its preparation, as, owing to the affinity of fatty bodies for oxygen, it is impossible to keep lard in a melted condition for such a length of time without materially affecting the product.

2. The difficulty of bringing the bark to a proper condition to yield its virtues to the lard and wax used.

3. The unsatisfactory appearance of the ointment.

4. The variation in strength, and consequent uncertainty of its operation.

In view of these objections, I made experiments in order to present a more eligible formula, for the preparation of the above mentioned ointment.

*Experiment 1.* Four ounces of the chipped bark was moistened with strong alcohol, and after standing 48 hours, was transferred to a percolator, and alcohol added until the bark was exhausted. This tincture was evaporated to the consistence of an extract, which weighed half an ounce. This was of a brownish green color, and possessed of the characteristic odor of the bark.

*Experiment 2.* An extract was prepared by treating 4 ozs. of the bark with ether, in the same manner as in the foregoing experiment. This extract was of a pale green color, and possessed the same odor as the alcoholic extract. It weighed 3 drachms.

*Experiment 3.* One drachm of the alcoholic extract was dissolved in one ounce of ether. This solution was thrown upon a filter, and after filtration and evaporation yielded an extract, weighing 29 grains, and resembling the alcoholic extract in appearance.

*Experiment 4.* Four ounces of the chipped bark was macerated with strong alcohol, and afterwards put into a percolator, and alcohol added, until 3 ozs. of tincture had passed. This was set aside and the percolation continued, until the alcohol came through colorless. The resulting liquid was evaporated to one fluidounce, and added to the three ounces previously obtained, thus making a fluid extract of the strength of an ounce of the bark, to a fluidounce of the extract.

Ointments were prepared from each of these extracts. The first was made from the alcoholic extract. This ointment, though of a satisfactory color, was objectionable on account of the specks of extract, which could not be thoroughly incorporated with the simple ointment used, without the expenditure of much time and trouble, in which respects it has but little advantage, save that of color, over the officinal ointment.

The ointments prepared from the ethereal and ethereo-alcoholic extracts, were liable to the same objections. So far, therefore, I obtained no ultimate advantage from the preparation of these extracts, in so far as they related to the manufacture of an ointment, which I wished to render unexceptionable.

Finally, however, I prepared an ointment from the fluid extract, which fully realized my highest expectations. The advantages of this ointment over the officinal, and those prepared from the solid extracts, are its uniform consistence, the shortness of time required in its preparation, and its highly satisfactory appearance. I would therefore respectfully submit the following:—

*Formula for Ung. Mezerei.*

℞ Axungiæ	ʒiv.
Ceræ Albæ	ʒij.
Ext. Mezerei Fl.	ʒiv.

The lard and wax having been previously melted together, and stirred until cool, the simple ointment resulting therefrom should be triturated with the fluid extract until thoroughly incorporated.

## ON CITRINE OINTMENT.

By JOHN S. LESTER.

Editor of the American Journal of Pharmacy.

DEAR SIR,—Being aware that there have been a great many suggestions made at different times, as to the mode of preparing Ung. Hydrargyri Nitratis, and that there still exists much doubt as to the eligibility of many of the formulas, either in this or other countries, I take the liberty of handing you the following formula, which I have used several years with better success than from any other. It may not be new, but if you should find upon examination that any advantages are to be gained, you are at liberty to publish it. The advantages which I believe it possesses over others are, the production of a most beautiful ointment, both in color and softness, the retention of the latter quality for any length of time when kept from the light, and in avoiding the loss of acid which takes place in dissolving metallic mercury in the officinal process. I should be pleased to have your opinion\* as to what difference, if any, follows the use of red oxide of mercury, instead of metallic mercury.

Take of Red oxide of mercury an ounce.

Commercial nitric acid (sp. gr. 1.38) three ounces av.

Prepared lard,

Olive oil, (best) each seven ounces.

White wax, half an ounce.

Dissolve the oxide of mercury in the acid by the aid of a gentle heat, melt the lard and wax in the oil by a moderate heat in a vessel capable of holding about six times the quantity, and while the mixture is hot, add by degrees the mercurial solution also hot, and if the mixture does not froth up, apply more heat until it does, then stir constantly until cool after removing from the fire.

*Appleton, Wisconsin, July 14, 1862.*

[\* The result will depend entirely on the strength of the acid and the mode of proceeding. When the officinal directions are followed the mercurial salt is a mixture of proto-nitrate and per-nitrate of mercury with free nitric acid. In the above recipe per-nitrate only exists with excess of nitric acid. If the nitric acid used is strong, the ointment will be more active than the officinal; if weak it may be less active. We find no difficulty in using the officinal process and materials.—EDITOR AM. JOURN. PH.]

## GLEANINGS FROM THE FRENCH JOURNALS.

By THE EDITOR.

*Senecio doronicum* substituted for *Arnica*.—M. Timbal Lagrave, of Toulouse, states (Rep. de Pharm., Mai, 1862,) that an herb gatherer of that city has been furnishing the herb of *Senecio doronicum* for *arnica*, and points out the means of distinguishing them from each other.

*On Aribine, a new organic base*.—M. Rieth has extracted this body from the bark of *Arariba rubra*, a tree growing in the virgin forests of Eastern Brazil. This tree, according to M. Martius, approaches the *Cinchonacæ*. The bark is characterized by the red color of its internal layers, and is employed by the Indians for dyeing wool red. A new alkaloid has been extracted from it which has received the name of *aribine*. The process is as follows:—The bark in small fragments is digested in dilute sulphuric acid. The united liquors are filtered, evaporated to one-tenth, neutralized by carbonate of soda, and precipitated by an excess of acetate of lead. After filtration, the solution is treated by sulphuretted hydrogen, filtered and precipitated by an excess of carbonate of soda.

The whole is now agitated with ether, which dissolves the base and rises to the surface. The ethereal liquid is then agitated with a slight excess of hydrochloric acid, which extracts the aribine, and separates as a crystalline precipitate insoluble in ether. To get the alkaloid pure, the salt is again precipitated and crystallized from ether. Aribine presents the form of large anhydrous rhomboidal octohedrons, and also occurs in long, thin, hydrated prisms, which effloresce in the air.

Deposited from boiling ether the crystals are anhydrous, whilst from ether by spontaneous evaporation the crystals contain 29.03 per cent. of water or 16 equivalents. Its taste is very bitter, though but little soluble in water. It has an alkaline reaction, and melts at 229° C. without decomposition. Dry, it absorbs hydrochloric acid with disengagement of heat. The chlorohydrate crystallizes in brilliant prisms, soluble in water, and insoluble in hydrochloric acid. Alkalies precipitate the base in the form of a white substance, which becomes crystalline when heated. Chloride of potassium forms with the hydro-

chlorate a double salt. Tannic acid does not precipitate the base.

It is remarkable that aribine does not contain oxygen; its composition is expressed by the formula  $C_{46}H_{20}N$ . It is consequently the first instance of a solid non-oxygenous organic base in nature.—*Repert. de Pharm. Mai, 1862.*

*Falsification of Balsam of Copaiba.*—M. Reveil has examined a specimen of copaiba taken by l'Ecole from a druggist. This balsam is remarkable for its terebinthinate odor, is solidifiable by magnesia, and nearly completely soluble in absolute alcohol; but ammonia solidifies it immediately, whilst it troubles but momentarily the pure balsam of copaiba of the Central Pharmacy, and gives with Para balsam an emulsion of slight consistence. A mixture of Para copaiba and turpentine is also solidified by ammonia.—*Jour. de Chim. Med.*

*Vanilla at Reunion.*—It was only between 1840 and 1844 that this culture was commenced. The events which followed the revolution of 1848 caused its neglect, and during the following ten years the product was small. It is only since 1857 that this culture has received a greater development. Unhappily for the producer, the price has followed an inverse ratio,—falling as the produce increased, not from a degeneration of quality in the vanilla, but from excess in the market.

Here is a table of exportation and the mean prices of vanilla at Reunion from 1857 to 1860:

1857, exported	1200 kilograms	sold at	150 to 170 francs	per kil.
1858,       "	2009       "	"	200 to 250       "	"
1859,       "	3000       "	"	160 to 200       "	"
1860,       "	6000       "	"	66 to 100       "	"

It is a subject of inquiry at Reunion at this time to find a market for vanilla, and it is proposed to send some of it to China where they think this article will be sought for.—*Repert. de Pharm. from Ann. de l'Ag. des Colonies.*

*Characteristics of the purity of Chloroform.* By M. Hardy.—If a little fragment of sodium is thrown into chloroform, it remains intact if the chloroform is pure.

When this anæsthetic agent contains alcohol or other sub-



stance capable of alteration, gas is produced. In most cases these gases are hydrogen, marsh gas, or carbonic oxide; they are entirely formed of hydrogen and carbonic oxide if the foreign substance is wood spirit. This reaction occurs in the cold and nearly instantaneously.—*Rep. de Pharm.*, Av., 1862.

*Opium altered by age.*—In his memoir on opium, M. Guibourt states, that in analysing an opium kept in his store nearly twenty years, he obtained less morphia than he had extracted from the same opium when recent. The product obtained was strongly colored, and the alcoholic solution equally so. The extractive matter, (says the professor,) and other principles without doubt, the morphia, perhaps, is converted into a brown body (apotheme?) little soluble in water, but soluble in alcohol like morphia, and precipitating with it by the cooling of the liquid, and can only be separated by combining the alkaloid with an acid, and decolorizing the salt by charcoal, &c.—*Rep. de Pharm.* Avril, 1862.

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#### ON THE CLEANING AND PRESERVATION OF ENGRAVINGS.

Augustus A. Hayes, M. D., State Assayer of Massachusetts, says in the *Scientific American* :—

The frequent inquiries addressed to me by those who possess valuable engravings—which have become damaged through accident or exposure—respecting a mode I adopted successfully for restoring some very fine ones, induce me to publish a general process applicable to the largest number of cases.

Any one who will incur the trouble of looking up in the older print-shops and depositories in residences in this country, will find abundance of defaced engravings of rare merit, the works of the best masters rejected, which can be restored easily to quite their former degree of freshness and beauty. All who have studied the better efforts of the old artists in giving permanency to their conceptions in this department of art, assign to it a very high place, and it may be suggested that a higher cultivation and enjoyment of design and execution, in so far as the influences of light are concerned, may be gained from careful observations of engravings than can result from time be.

stowed on paintings which often command public admiration, or are the so-called gems of an exhibition.

In commencing to restore an engraving, some attention must be given to the kind of injury it has suffered. A general brown color, more or less deep, resulting from atmospheric action only, is the least possible change. Spots and stains caused by ink, colored fluids, oil or insects must be first treated, and all pencil marks removed by india-rubber or bread crumbs. A fluid acid, obtained by dissolving one ounce of crystals of oxalic acid in one-fourth of a pint of warm water, may be used for application to all stains, and the paper should be wet with it thoroughly where spots of any kind exist. Excepting in a few cases, this acid will not cause the removal of stains immediately, but generally it combines with the bases of them, and they are removed by subsequent steps; the thorough wetting should be done a few hours before proceeding to clean the engraving.

To facilitate handling and for the protection of the edges of the paper, a piece of millinet, or the stiff open fabric formerly sold for ladies' skirts, should be roughly sewed around one stick at each end, so as to form an apron, like a chart attached to two rollers, the cloth of which must be an inch larger than the largest print to be handled. From one to ten prints of even large size may be cleaned at one time, after they have been wet on their spotted parts with the acid, and evenly spread on the apron, so as to allow of the immersion of the whole in water. A tub of the ordinary size will allow prints of considerable surface to become immersed, but the most desirable resort is a common bathing vessel, so nearly filled with warm water that the bent paper supported by the open texture can rest on the bottom and sides, where it should be allowed to remain, with occasional raising of it, and moving it by means of the stick handles, from twelve to twenty-four hours.

On the first trial a degree of alarm will be felt in the case of a highly-prized favorite at this seeming careless treatment; but it must be borne in mind that paper is a firmly felted mass of short fibres which may be soaked in various fluids for weeks and resist all diluted acids and most chemical agents for a long time wet, if not exposed to mechanical abrasion by touch or rapid motion. The strong paper of engravings absorbs much air,

which resists the penetration of the water, and motion is necessary to remove this as well as to allow the colored solutions formed to pass away. This motion may be given by holding the supporting sticks and passing the mass from end to end of the bath, or slowly up and quickly down, enabling the sheets to become separated momentarily. Discolored water may be drawn off, the apron and contents resting on the bottom and sides, and fresh water be slowly admitted to replace it. Cold water can be substituted for warm, longer time being allowed for its action. When the prints no longer add color to the water after being agitated, the water must be withdrawn and replaced by such a portion as will barely cover the paper. Half a pound of bleaching powder (chloride of lime) mixed to a paste first in cold water, and then added to two quarts of cold water and well stirred from time to time for six hours, will afford a nearly clear fluid resting on a white deposit in the earthenware vessel. A portion of the clear part of this fluid must be added to the water in the bath, until both taste and odor denote the presence of chlorine in the water. Motion being given to the paper, the bleaching effect of chlorine will be perceived, or its odor in the water will have been lost, when more must be added so that the odor or taste of chlorine must be present in the water two or three hours.

The action of the chlorine on the parts previously wet with the acid will remove nearly every kind of discoloration, while the brown hue of the paper giving place to perfect whiteness, the light and shadows of the engraving become of their original perfectness, and the picture will be as distinct as when it was first impressed. It has happened in a few trials, when the prints were long stained, and they did not yield to the weak chlorine water, that resort was to have a little mineral acid to develop free chlorine in the bath. One ounce of muriatic acid was added to one pint of cold water, and the weak acid thus formed, mixed in the water of the bath, soon caused the bleaching of every fibre in the paper.

After the bleaching the water must be drawn off, the paper drained, fresh clear water admitted, and the paper moved through the water to thoroughly wash away all adhering chlorine. Several quantities of water may be used, the paper being each time drained; and finally, the whole mass, raised by the handles,

may be placed on a clean white wood table or board to drain. If a number of prints have been treated, the wet mass may be placed in a warm room, or air may be admitted, and as the one on the top of the pile becomes more dry than the rest, it may be removed to any support and left to dry. In hastening the drying I have extended ordinary bed sheets and spread the wet prints singly on these, slow drying rendering any pressing unnecessary.

Those having the usual presses might prefer to press the still damp sheets, and where only two or three prints are the subjects of trial, the substitution of other vessels and ready appliances will occur to any one.

This description is given in detail purposely, although unnecessary, so far as the process is concerned, because I wish to impress on the mind of any one who possesses an injured engraving that it can be restored to its original value without the expenditure of much attention; and it must not be the conclusion, from reading this process, that great care is required, for time is insisted on rather than attention. The few dispositions being made, not the slightest care need be given to the matter. If the bath can be spared, the odd minutes of a week will enable one to restore dozens of specimens, and give permanency to their beauties.—*Chem. News*, July 26, 1862.

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#### HORSLEY'S TEST (?) FOR STRYCHNIA.

Under this caption Prof. J. E. D. Rodgers, of St. George's School of Medicine, criticizes the article of Mr. Horsley (see pages 433 and 434 of this number) on nitro-prusside of sodium as a test for strychnia, and asserts that Mr. Horsley must have used an impure test, because pure nitro-prusside will not cause such a reaction. Mr. Horsley appears, from his own admissions, according to Prof. Rodgers, (*Chem. News*, Aug. 2, page 69,) to have used a nitro-prusside solution containing ferridcyanide of potassium! one of the best color tests of strychnia yet known. Mr. Horsley, however, now claims (*Chem. News*, July 26, page 56) that his impure test owes its intense delicacy not to nitro-prusside or to ferridcyanide, but to some substance which he has not himself identified, and offers to furnish samples of the reagent to any chemist interested.—EDITOR AMER. JOUR. PHARM.

## CHEMICAL RESEARCHES ON THE SPONTANEOUS DECOMPOSITION OF PYROXYLIN.

By M. S. DeLuca.

The pyroxylin, or gun cotton, employed in this investigation, was bought in Paris in 1859, and preserved, sheltered from the light, in a wooden box, perfectly close, in the Chemical Laboratory of the Faculty of Sciences, at Pisa. It was enclosed in a glass bottle, stopped with a cork and sealed with wax. Its spontaneous decomposition had occurred during the summer of 1860, with disengagement of nitrous vapors.

This decomposed pyroxylin had lost all its original properties. In fact it had a white aspect, a little yellowish at the sides; was pasty and sticky; possessed a strong acid taste, emulsionized with cold distilled water, and the emulsion thus formed passed slowly through filtering paper. The filtered solution, which was limpid, reddened litmus, disengaged nitrous vapors when in contact with copper and sulphuric acid, was colored strongly yellow by ammonia and potassa, reduced the tartrate of copper and potassa, was not colored by an aqueous solution of iodine, became brown when heated with sulphuric acid, and gave a precipitate with an excess of lime water which had all the characters of an oxalate. The solution disembarassed of the lime precipitate, subjected to a current of carbonic acid gas, and carried to ebullition to separate the carbonate of lime, easily reduced the tartrate of copper and potassa.

The modified gun cotton put under a bell glass, with concentrated sulphuric acid, becomes perfectly white, preserves its acidity, can be reduced to powder under the pressure of the finger, and loses 38 per cent. of its weight. In fact, 5.346 grms. of this cotton left thus in contact with sulphuric acid, from December 22d, 1860, to June 20th, 1861, lost 1.919 grms.

This cotton, when subjected to heat lost weight, as follows:—

Weight of cotton. Grms.	Temperature.	Loss.	
		Total.	Per cent.
2.352.....	212° to 230° F.....	0.791.....	33.2
4.328.....	230° to 248° ".....	1.632.....	37.7
2.187.....	248° to 266° ".....	0.823.....	37.6
2.458.....	266° to 284° ".....	0.605.....	41.5
2.187.....	302° to 320° ".....	0.914.....	41.8

Now the 2.352 grms. of gun cotton mentioned have given :—

	Grms.
Water and nitrous vapors from 212° to 230°.....	0.791
Matter soluble in ether.....	0.009
Matter soluble in alcohol.....	0.210
Matter soluble in water.....	1.227
Matter insoluble in water and alcohol.....	0.070
Loss.....	0.045
	<hr/> 2.352

It results from these numbers that the modified gun cotton, after being dried at 230° F., yields to alcohol 14 per cent. of its weight, and to water 78 per cent. ; that is to say, nearly the whole of the dry matter, consequently it follows that gun cotton, which is insoluble in water and alcohol, in decomposing spontaneously, can, under the influence of the nitrous vapors which it disengages, give rise to products neutral and acid, soluble in water and in alcohol, and which the author is engaged with at this time.

When the aqueous solution of the altered cotton is evaporated on a water bath, a substance is obtained, which swells in volume and becomes spongy towards the end of the evaporation. This substance is light, white, friable internally, but adhesive where in contact with the air, owing to its hygroscopic tendency. This matter is spongy, it is not soluble in ether, to which, nevertheless, it communicates a slight acidity ; neither is it soluble in a mixture of alcohol and ether, but it is partially soluble in alcohol. The matter dissolved by the alcohol reduces easily and abundantly the tartrate of copper and potassa ; the insoluble portion left in contact with moist air during 24 hours, assumes the appearance of a dense solution of gum.

The aqueous solution of altered gun cotton, when mixed with eight times its volume of alcohol, gives an abundant flocculent precipitate, which, when washed on a filter with alcohol and dried over sulphuric acid, is amorphous, nearly opaque, friable and with a gummy appearance. It dissolves easily in cold water, and the solution is precipitated by acetate of lead.

Altered gun cotton is attacked by hot nitric acid with the evolution of nitrous vapors, and the production of matters soluble in water, and precipitable by the salts of lead, silver and mercury.

These researches, in which I have been greatly aided by M. Ubaldini, will be pursued for the study of the neutral and acid matters contained in modified pyroxylin.—*Journ. de Pharm., Juin, 1862.*

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#### ON THE NEW METAL THALLIUM.

By M. A. LAMY.

On examining, three months ago, with MM. Kirchhoff and Bunsen's spectrum apparatus, a specimen of selenium prepared by my brother-in-law, M. Fred. Kuhlmann, from the deposits in the chambers in which sulphuric acid was made by the combustion of pyrites, I perceived a sharply-defined green line which I had not observed in any of the numerous simple bodies or mineral compounds which I had studied. I was not then aware that an English chemist, Mr. W. Crookes,\* had not only discovered the same green line under almost analogous circumstances, but had given the name of *thallium* to the new element, from the Greek word *θαλλος*, or Latin *thallus*, frequently employed to express the rich tint of young and vigorous vegetation. Mr. Crookes, with great skill, described several of the reactions of the element, which he considered as a metalloid, probably belonging to the sulphur group; but the small quantity of substance did not permit him to isolate this element and recognise its true nature.

We have endeavored to isolate the new body by seeking for it in the deposits from the leaden chambers whence the selenium had been extracted, which gave us in the spectroscope the characteristic green line. This line has naturally served us as a guide, and has enabled us to prepare perfectly definite crystalline compounds, whence we have extracted thallium,—the first time with the assistance of an electric battery.

*Properties of Thallium.*—Thallium has all the characters of a true metal, and, in most of its physical properties, greatly resembles lead. Not quite so white as silver, it possesses a brilliant metallic lustre when freshly cut. It appears yellowish when rubbed against a hard body; but this tint is doubtless due

\* Mr. Crookes obtained the element in a pure metallic state, investigated its properties and exhibited it to several friends as early as January last, (see paper read before Royal Society, June 19, 1862.)

to oxidation, for the metal precipitated by a battery from an aqueous solution, or fused in a current of hydrogen, is white, with a bluish gray tinge, which resembles aluminium.

Thallium is very soft, and very malleable; it can be easily scratched by the nail, and cut with a knife. It marks paper, leaving a yellowish streak. Its density (11.9) is a little higher than that of lead. It fuses at  $290^{\circ}$  C., and volatilizes at a red heat. Lastly, thallium has a great tendency to crystallise, for the ingots obtained by fusion crackle like tin when they are bent. But the physical property, *par excellence*, of thallium,—that which, according to the beautiful researches of MM. Kirchhoff and Bunsen, characterises the metallic element,—that which led to its discovery,—is the property which it possesses of communicating to the pale gas-flame a green color of great richness, and to the spectrum of this flame a single green ray as distinct and as sharply defined as the yellow ray of sodium, or the red ray of lithium. On the micrometric scale of my spectroscope, this ray occupies the division 120.5, that of sodium being at 100. The slightest portion of thallium, or of one of its salts, gives the green line with such brilliancy that it seems white. The fifty-millionth part of a gramme can, according to my calculations, be recognised in a compound.

Thallium tarnishes rapidly in the air, becoming covered with a thin pellicle of oxide, which preserves the rest of the metal from alteration. This oxide is soluble, is decidedly alkaline, and has a taste and smell similar to potash. By this characteristic, as well as by its optical properties, thallium approaches the alkaline metals.

Thallium is attacked by chlorine, slowly at the ordinary temperature, rapidly at a temperature above  $200^{\circ}$  C. The metal then melts, becomes incandescent under the action of the gas, and gives rise to a yellowish liquid, which solidifies on cooling to a mass of a little paler color.

Iodine, bromine, sulphur, and phosphorus can also combine with thallium, forming iodides, bromides, sulphides, and phosphides.

Recently-prepared thallium preserves its metallic lustre in water. It does not appear to decompose this liquid at the temperature of ebullition, but, by the aid of an acid, it separates its elements, disengaging hydrogen.



Sulphuric and nitric acids are those which attack thallium easiest, especially by the aid of heat. Hydrochloric acid even boiling dissolves it very difficultly. Under these circumstances, there form white soluble salts, sulphate, and nitrate, crystallising readily, and a slightly soluble chloride, but capable also of crystallising.

The chloride formed by the direct action of chlorine or by *aqua regia* is deposited from its aqueous solution in the form of magnificent yellow plates, which appear to belong to the rhombohedral system.

Zinc precipitates thallium from its sulphate and nitrate solutions; the new metal deposits in brilliant crystalline plates.

Hydrochloric acid and protochlorides give, with the same solutions, a white precipitate of chloride of thallium resembling chloride of silver, but slightly soluble in water; otherwise, very little soluble in ammonia, and inalterable by light.

Hydro-sulphuric acid has no action on pure neutral or acid solutions; but if they are alkaline, a voluminous black precipitate of sulphide of thallium is produced, which readily settles to the bottom of the vessels, and is insoluble in an excess of precipitant.

Finally, potash soda and ammonia, do not displace oxide of thallium in combination with sulphuric and nitric acids.

*Natural State and Extraction.*—Thallium cannot be considered as very rare in nature. It exists, indeed, in many kinds of pyrites, which are used at the present time in large quantities, principally for the manufacture of sulphuric acid. I may especially mention Belgian pyrites, from Theux, Namur, and Phillippeville. I have also found it in mineralogical specimens from Nantes, and Bolivia in America.

Strictly speaking, thallium might be prepared from these pyrites; but it is much easier to prepare it by using the deposits from the lead chambers, where it accumulates in relatively large quantities during the manufacture of sulphuric acid. It is from these thalliferous deposits that I have extracted, by a method given in my memoir, the chlorides of thallium which formed the starting point of the study which I have made of the new metal and its compounds.

As to the metal itself, it may be reduced from one of its saline

combinations either by the decomposing action of an electric current, or by precipitation with zinc, or by reduction with charcoal at a high temperature. The chlorine may also be separated from its chlorides by potassium or sodium, under the influence of heat; in this latter case the reaction is very energetic.

The small ingot, weighing fourteen grammes, which I had the honor of exhibiting to the Academy, was entirely isolated by a battery of a few Bunsen elements, first from the chlorides originally obtained, and then from the crystallised sulphate formed directly by the solution of this thallium in pure sulphuric acid.

In concluding my memoir, I wish the Academy to understand that I do not pretend to lay before them a complete research on thallium. My object has chiefly been to show the new metal and some of the principal salts which it forms. In a subsequent communication I will endeavor to fill up some of the gaps at present in its history.—*Chem. News, Lond. July 19, 1862.*

#### ON COCAINA, THE ACTIVE PRINCIPLE OF COCA.

By M. LOSSEN.

The author, whose researches follow those of M. Niemann, (see *Amer. Jour. Pharm.*, page 122, 1861, and also Maisch's paper, *ibid*, 496,) has examined cocaina in reference to the products of its decomposition. When heated with chlorohydric acid it splits into *benzoic acid*, and a new base which the author calls *ecgonin*,\* which confirms an observation before made, to wit, that the double chloride of gold and cocaina gives rise when heated to the disengagement of benzoic acid. The new base having for its formula  $C_{18}H_{16}NO_6$ , cocaina, under these circumstances, is purely and simply split into benzoic acid and and ecgonina by fixing the elements of two equivalents of water. Reduced by concentration, the hydrochloric solution deposits a crystallization of benzoic acid; the mother waters are not precipitated by carbonate of soda, and it was this circumstance that led to the discovery of the new base.

The operation succeeds best when you operate at  $212^{\circ}$  in a sealed tube; the chlorohydrate of ecgonina crystallizes last. This base is soluble in water; bichloride of platinum precipitates it only in pres-

\* From *ecgon*, son, descendant.

ence of much alcohol; the double salt separates then little by little in long orange yellow prisms.

This mutability of cocain offers an explanation of the fact that attempts to obtain that principle by operating on coca with acid liquids have failed. Perhaps, also, this alkaloid is subjected to an injurious transformation in old leaves. From this action of chlorohydric acid it can in all cases be inferred that it is necessary to avoid the presence of free acids in preparing cocaina from coca leaves.

The following is the process recommended by M. Lossen: The leaves having been digested several times at  $140^{\circ}$  to  $176^{\circ}$ , the aqueous infusions are united, precipitated by acetate of lead, filtered, and the lead removed by means of sulphate of soda, and the liquid concentrated in a water bath. Then carbonate of soda is added, and the whole shaken with ether. This is decanted, and the ether renewed five or six times; the alkaloid is dissolved in the ether, which is regained by distillation. The residue on standing yields crude cocaina, which is purified by first triturating it with cold water to remove the coloring matter, and in submitting it afterwards to the treatment already described by M. Niemann. The purer the cocaina is, the more easily it crystallizes in ether, and gives at the same time very handsome rhomboidal prisms.

Amylic alcohol is less favorable to this extraction, but its employment has conducted to the discovery of a new liquid alkaloid, *hygrina*,\* volatile, and capable of being distilled with water. Its odor recalls that of trimethylamin. It has a strong alkaline reaction, and gives white fumes with volatile acids.

Themuriate of hygrina is crystallizable, but very deliquescent; the chloroplatinate is a yellow flocculent uncrystallizable precipitate which decomposes at ebullition.

With bichloride of mercury this alkaloid produces a milky discoloration occasioned by oily drops.

It appears also to be evolved when coca is heated with caustic lye in milk of lime.

Hygrina is not poisonous.—*Jour. de Pharm.*, Juin, 1862, from *Ann. der Chem. und Pharm.*, t. cxxi., p. 372.

\* From *hyper*, liquid.

## ON THE PREPARATION OF PERMANGANIC ACID.

By M. A. TERRELL.

The chemist Chevilhot first stated that when permanganate of potash is mixed with sulphuric acid and heated to  $180^{\circ}$  C., violet vapors are obtained, condensable into an oily red liquid, consisting, according to this chemist, of sulphuric acid and permanganic acid.

More recently, M. H. Aschoff has prepared permanganic acid in the same way, but only collecting the small drops forming in the mixture of permanganate of potash with concentrated sulphuric acid.

I now propose to give some new facts about the preparation of permanganic acid, and to describe some new properties of this acid.

Permanganic acid is obtained by dissolving permanganate of potash in pure sulphuric acid, diluted with about half an equivalent of water, taking care that the temperature does not get too high. The solution is a yellowish green. Introduce it into a tubulated retort communicating with a well cooled receiver. In this apparatus neither corks nor other organic matter must be used.

The retort is placed in a water bath and heated to a temperature not exceeding  $60^{\circ}$  or  $70^{\circ}$ ; at a higher temperature sulphuric acid passes over. The apparatus then becomes filled with violet vapors, resembling those of iodine. The vapors soon condense in the neck of the retort to a thick liquid of a greenish-black color, which contains neither sulphuric acid nor chlorine. This is permanganic acid.

It is difficult to prepare a large quantity of this acid at once. It always, at a certain time, when the proportion of distilled acid commences to be considerable, decomposes spontaneously with a slight detonation. After this decomposition a solid body is found in the apparatus of a brownish-black color and extreme lightness, possessing the properties of sesquioxide of manganese.

If the sulphuric acid solution of permanganate of potash is exposed to moist air for some time, or, better, if a few drops of water are added to it, the permanganic acid will be seen to

float upon the surface of the liquid in the form of oily drops of a greenish-black metallic lustre, which sometimes solidify and fall to the bottom of the liquid. It is difficult to separate this acid from the sulphuric acid which contaminates it; but in this state the permanganic acid may be used for the oxidation experiments described below.

Permanganic acid is a thick liquid, of a greenish-black color and metallic appearance. It seems to be capable of solidifying. It is very greedy of water. Its solution is violet, and it keeps pretty well when dilute and free from dust.

If permanganate of potash is suddenly heated it detonates; but if moderately heated, part volatilises, producing violet vapors, which possess a very disagreeable metallic odor.

This compound is perhaps the most energetic oxidising agent known. It instantly sets fire to paper and alcohol, the latter with explosion. In these combustions there are always produced violet vapors, due to the volatilisation of a certain quantity of permanganic acid. It detonates suddenly, with emission of a beautiful white light when placed in contact with a fatty body. In this case very little acid must be used, for the detonation is very strong.

If a few drops of solution of sulphite of potash is poured upon permanganic acid a very lively reaction is produced with disengagement of light. A large quantity of acid is carried off in the form of violet vapors, which are reduced in the air, and fall down in the form of brown flocks, very light, similar to oxide of zinc when this metal is burned in contact with air.

This curious reaction will doubtless become a beautiful lecture experiment. It succeeds very well with the permanganic acid formed in the sulphuric solution of permanganate of potash.

Permanganic acid is slightly soluble in concentrated sulphuric acid; the solution is green. Its solution in sulphuric acid containing three equivalents of water is violet. This change of color seems to point out that there exist an anhydrous permanganic acid and a hydrated acid.

The instability of permanganic acid has hitherto prevented me from determining its composition.—*Chem. News, London August 2, 1862, from Bulletin de la Société Chimique de Paris*

## QUICKSILVER MINES OF NEW ALMADEN, CALIFORNIA.

The latest advices from California state that the quicksilver mines of New Almaden, which were so long a subject of litigation, are now again in full operation, and that their yield is immense. According to one account, the workmen have reached the depth of 18 ft. below the surface, and the quicksilver is still found in little globules, so thick that a stream almost follows the stroke of the pick. The *San Francisco Mining and Scientific Press* says—"There have been many recent discoveries of rich cinnabar in various portions of our prolific State, in consequence of the long stoppage of the great New Almaden Mine, owing to tedious and vexatious litigation. This mine, however, is at last in full operation again, and its annual product of over 1,000,000 lbs. of quicksilver will again be in the market. The New Almaden, New Idria, Enriquita, and Gaudaloupe Mines of Santa Clara county, with the many recently discovered and only partially worked cinnabar veins of Napa and Sonoma counties (which contain liquid quicksilver), already turn out some 4,000,000 lbs. of quicksilver per annum—an amount nearly large enough to supply the world—and, doubtless, when these latter shall have been more thoroughly opened, the yield will reach the high figure of 8,000,000 lbs., the value of which, at the rate of 30 cts. per lb., would be no less than \$2,400,000; and this we think is a moderate estimate. Hittell sets the average aggregate annual yield of the four great Santa Clara Mines at 3,510,000 lbs., but it has reached as high as 4,275,000 lbs.; and as they are by no means worked to the best advantage, we may safely look for largely increased returns as the operation of the companies are extended. Lack of experience, money, and harassing litigation, heretofore have very much retarded these operations; and we shall not be at all surprised if within the next ten years the annual yield from Santa Clara doubles itself. If the accounts of discoveries in Napa and Sonoma counties approach the truth, then we have a still richer district there, whose yield can hardly be computed. Accounts recently received from Washoe also speak of rich cinnabar veins discovered; we hope the reports are true. With so many mines, and such vast yields, we may safely predict that the wholesale

price of quicksilver will constantly decrease until it reaches 8 or 10 cents per lb. Quicksilver will then be used with a more liberal hand in the search for gold and silver, and many other advantages to the world will arise from its cheapness."—*Journ. Frank. Inst., Aug. 1862, from Lond. Mining Journal.*

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#### OAKUM AS A SUBSTITUTE FOR LINT, IN GUN-SHOT AND OTHER SUPPURATING WOUNDS.

By LEWIS A. SAYRE, M. D., Surgeon to Bellevue Hospital, etc.

I have for many years past been in the habit of using picked oakum, in all cases of suppurating wounds, particularly in connection with opened joints, where the suppuration is excessive. The great number of gun-shot wounds now in Bellevue Hospital, where I use it entirely to the exclusion of lint, has furnished an opportunity for a number of army surgeons to examine its advantages, and they have requested me to make the subject more generally known to the profession through the medium of your valuable medical journal.

One of the objects of lint applied to a suppurating wound, is to absorb the discharge; now as most of the lint is composed either entirely or in great part of cotton, it acts more like a tampon, or a retainer of the secretions, than as an absorber.

If you will take a bale of cotton and immerse it in the river for one month, or even longer, and then remove it, you will find on opening it that the cotton in the centre of the bale is perfectly dry, thus proving that it cannot be soaked through any great thickness, or that it will not absorb moisture. So, when placed over a suppurating wound and left for some hours, it will be found perfectly dry except at the point of contact: acting, in fact, like a bung in a barrel, or a cork in a bottle—to *prevent* the escape of the pus—which necessarily burrows in different directions, thus forming extensive abscesses, and adding greatly to the danger of the patient; and when removed, the pus will gush out in large quantities. Now, if you place picked oakum over these same wounds, you will find after the same number of hours, that the oakum is perfectly saturated with pus, and the wound itself almost perfectly dry and clean—the oakum acting

like a syphon, and discharging the contents of the abscess by capillary attraction.

It is necessary to place under the wound a piece of india-rubber cloth, or oiled muslin, for the sake of cleanliness; and in case of much inflammation, by simply wetting the oakum in cold water, and wrapping the oiled muslin around the limb, or wounded part, so as to exclude the air, you have at once the neatest and most comfortable poultice that can be applied to it. In gun-shot wounds, which go through and through a limb, particularly if made with the "Minnie ball," the whirl or screw of the ball entangles in its thread the muscular fibres and cellular tissue, and separates them from their attachments for a long distance from the real track of the ball itself.

As the muscle and tegumentary tissues are more freely supplied with blood-vessels than the fat and cellular tissue, the consequence is that they begin to granulate much more readily than those other tissues, and will thus often close up the wound, and prevent the free escape of pus, before those parts have perfectly healed, and thus lead to the formation of extensive secondary abscesses. I, therefore, in all cases where no blood-vessels prevent it, pass an eyed probe through the wound and draw through it a few fibres of the oakum or tarred rope, which keeps it perfectly free, and the tar is a very excellent antiseptic, and removes all unpleasant odor.

A few fresh fibres are twisted on the end of the seton at every dressing and drawn into the wound, and the soiled piece cut off and removed with the dressings.

Another great advantage which the oakum possesses over lint, which in these times of heavy taxation is not to be overlooked, is its cheapness. Lint at the present time costs from \$1.25 to \$1.85 per pound, whereas the finest picked oakum can be obtained at the "Empire Oakum Works," No. 149 West 39th street, for ten cents per pound. And if it were universally adopted in the army it would save many thousands of dollars to the Government, and I confidently believe the life of many a soldier. And no surgeon who has once used it will ever resort to lint again—particularly if the lint is made of cotton.—*American Medical Times, August 9th, 1862.*



RUSSIAN METHOD FOR THE PRESERVATION OF FRUITS,  
VEGETABLES, &c.

At the last exhibition at St. Petersburg, the following mode of preserving fruits, invented by the *maitre d'hotel* of the Grand Duke Nicholas, attracted great attention from amateurs. Quicklime is slacked in water, into which four or five drops of creosote for each quart of water have been mixed; the lime must be neither too much nor too little slacked; there is a certain knack which practice alone can teach. Take a box and lay in its bottom a bed of the slacked lime; above this spread a layer of the materials to be preserved; at the four angles and elsewhere lay packages of powdered charcoal; then make another bed of the lime, followed by another layer of the fruit. When the box is full put on the lid, and close it air-tight. Thus preserved, the fruits will last a whole year.—*Journ. Frank. Inst., May, 1862, from Cosmos.*

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## PROPER TIME OF YEAR FOR CUTTING WOOD.

Four pine trees of the same age, equally sound, which had grown on the same soil and under the same conditions, were chosen. The first was cut at the end of December; the second at the end of January; the third, at the end of February; and the fourth, at the end of March. They were shaped in the same manner, into beams of the same dimensions, and seasoned under the same conditions. Their resistances to bending were then determined by laying them on supports and loading them at the middle. The resistance of the first beam (that felled in December) being called 100; that of the second was 88; of the third 80, and of the fourth 62.

Similar results were obtained as to the durability and strength of posts made of sticks cut at the end of December and of March. The first were still perfectly sound after 16 years; the second at the end of 8 or 4 years broke with the slightest effort. All were buried in the same soil and under the same conditions.

Four oaks as like as possible, and placed in the same condi-

tions, were cut at the end of December, January, February and March. A disk of the same thickness was cut from each at the same height above the ground, and was made the bottom of a vessel filled with water; the sizes of the vessel and height of the water being the same in all. The first (cut in December) allowed no water to pass; the others passed more or less; that cut in January, at the end of 48 hours; that of February, before the end of the second day; that of March, in two hours.

Two similar oaks were selected and felled, the one at the end of December, the other at the end of January, and staves made of the wood. Barrels were made of them, which were soaked in the same way, and then filled at the same time and with the same wine. In a year the barrel made of the wood cut in December had lost 0.14 quart, while the other had lost 7.2 quarts. —*Journ. Frank. Inst., May 1862, from Cosmos.*

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#### INDIA-RUBBER VARNISH.

That india-rubber dissolved in various liquids yields a good varnish is well known; but in general they are too viscid for delicate purposes, and are only good for making stuffs water-proof. India-rubber liquefied by heat, dissolved in oil of coal-tar, or drying linseed-oil, does not give a varnish of sufficient fluency, or free from smell. Moreover, a considerable quantity of india-rubber remains undissolved in a gelatinous state, suspended in the liquid, so that the solution is never clear. Dr. Bolley has recently published some remarks on this subject which may be useful. If india-rubber be cut into small pieces and digested in sulphuret of carbon, a jelly will be formed; this must be treated with benzine, and thus a much greater proportion of caoutchouc will be dissolved than would be done by any other method. The liquid must be strained through a woollen cloth, and the sulphuret of carbon be drawn off by evaporation in a water bath; after which the remaining liquid may be diluted at will with benzine, by which means a transparent but still yellowish liquid will be obtained. A more colorless solution may be prepared by digesting india-rubber cut into small pieces for many days in benzine, and frequently shaking the bot-

tle which contains it. The jelly thus formed will partially dissolve, yielding a liquid which is thicker than benzine, and may be obtained very clear by filtration and rest. The residue may be separated by straining, and will furnish an excellent water-proof composition. As for the liquid itself, it incorporates easily with all fixed or volatile oils. It dries very fast, and does not shine, unless mixed with resinous varnishes. It is extremely flexible, may be spread in very thin layers, and remain unaltered under the influence of air and light. It may be employed to varnish geographical maps or prints, because it does not affect the whiteness of the paper, does not reflect light disagreeably as resinous varnishes do, and is not subject to crack or come off in scales. It may be used to fix black chalk or pencil drawings; and unsized paper, when covered with this varnish, may be written on with ink.—*Journ. Frank. Inst.*, 1862, from *Galignani*.

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#### ON A NEW PROCESS FOR THE PREPARATION OF PHOSPHORUS.

By M. CARI-MONTRAUD.

Taking advantage of the long-established fact of the decomposition at a high temperature of dry phosphate of lime mixed with carbon by hydrochloric acid, M. Cari-Montraud founds upon this reaction a new process for the preparation of phosphorus.

Calcined bones finely powdered are mixed with sufficient pulverised wood charcoal to convert all the oxygen of the tribasic phosphate of lime into oxide of carbon. The mixture is put into fire-proof earthen cylinders, glazed inside, which are three parts filled. These cylinders being made red-hot, a current of hydrochloric gas is passed in at one of the extremities.

Under these circumstances the phosphate of lime decomposes immediately. Chloride of calcium, oxide of carbon, hydrogen, and free phosphorus are formed.

The phosphorus is distilled, and is conducted, together with the oxide of carbon, the hydrogen, and the excess of hydrochloric gas, by means of a copper adapter, into a vessel filled with cold water, where the phosphorous vapors are condensed.



## ON THE EXAMINATION OF COMMERCIAL SULPHATE OF QUININE FOR OTHER ALKALOIDS FOUND IN THE CINCHONA BARKS.

BY DR. G. KERNER.

In most of the Pharmacopœias and Chemical Manuals we find the well-known ether-test recommended for the recognition of cinchonine and quinidine, in commercial sulphate of quinine. This test consists in treating six grains of the sulphate in question with from sixty to seventy drops ( $=2$  c. c.) of ether in a well-stoppered test cylinder, to which six drops of liquor ammoniæ are added, and in well shaking the mixture. The fluid separates into two layers, a clear aqueous and an ethereal one. The upper layer should not deposit an amorphous or crystalline mass, either immediately or in the course of a few hours. This method suffices in most cases, for it indicates even minute traces of an admixture of cinchonine and of the ordinary quinidine. It indicates clearly one-half to three-quarters per cent.; or if an ether which has been previously saturated with quinidine be employed, even smaller quantities of the latter alkaloid. I have, however, frequently found in my experiments, that ether cannot implicitly be relied on, or recommended as a safe means of separating the bases of the cinchona barks. The ether-test itself exhibits irregularities which render the observation of the reaction a matter of uncertainty. The ethereal solution frequently solidifies to a gelatinous mass, which at times is perfectly clear and transparent, sometimes traversed by net-like layers of enclosed air, which impart to it a crystalline appearance, and give rise to errors, since they render it exceedingly difficult to distinguish whether crystals of quinidine have separated from the ethereal solution or not. It is probable that the cause of the formation of this magma will be explained best by viewing it as a double salt of the quinine salt with the ammonium salt formed in the reaction, since I was able to trace in the gelatinous mass almost invariably sulphuric acid and a salt of ammonium, not met with in the ethereal solution when the reaction went on properly. It was not, however, this, for the most part accidental occurrence, which vitiated the ether-test, but the circumstance which my experiments brought to light,

—that there are alkaloids in the cinchona barks, which, although isomeric, and partly also isomorphous with the ordinary quinidine, still exhibit many abnormal chemical properties, amongst which I may especially mention a very different (far greater) degree of solubility in ether. I made experiments with the sulphates of these quinidine bases which were more soluble in ether, and found that from ten to twenty per cent. of these salts could be mixed with the pure sulphate of quinine without being detected by the ether-test; and it is to be feared that manufacturers may make use of this property of the new alkaloids to enable them to sell under the protection of the ether-test an inferior sulphate of quinine mixed with other cheaper sulphates. Now it would be quite possible to detect an extensive adulteration, when once known, by other means (ex. gr. by treating the alkaloids precipitated from the mixed sulphates with spirits of wine of 20° Beaumé; but it would be exceedingly difficult, nay, even impossible, qualitatively to detect, by means of this test, smaller unintentional adulterations (impurities.) I therefore set to work to find out a quinine test which would be both accurate and easy of execution, and by which it would be possible to detect even very small quantities of the above *new* bases.

Before I enter upon the description of the experiments made for this purpose, I may be permitted to give a short sketch of the characteristic properties of the cinchona alkaloids in general, on account of the confusion in their nomenclature which prevails among chemists. A few remarks on this subject may, therefore, be acceptable in this place. Chemists who have had an opportunity of studying the cinchona bases must have observed that quinine, cinchonine, quinidine, and cinchonidine are not the only bases found in the barks, but that frequently modifications of these principal bases are met with in the cinchona barks, which differ in many essential points from them. I believe, however, that all organic bases derived from the barks (whether known or not yet known,) may be conveniently arranged into two distinct groups until science succeeds in unravelling the true constitution of these substances, viz:—

*I. Group.*—Quinine and its isomerides, of the formula  $C_{40}H_{24}N_2O_4 + x HO$ .

**II. Group.**—Cinchonine and its isomerides, of the formula  $C_{40}H_{24}N_2O_2$ .

This classification does not comprise some of the more obscure bases, whose formulæ require further confirmation before they can be accepted as forming part of Groups I. and II. of alkaloids, or whose derivation from cinchonas is doubtful (ex. gr. aricine, paracine, cinchovatine, pitayine, blanchinine, Gruner's bases, etc.)

**I. Group.**—*The solutions of salts of these bases give, in every instance, the well-known reaction with chlorine water and ammonia. The pure alkaloids form hydrates, which effloresce readily.*

1. **Quinine** (forming crystallizable salts.)—When pure it is generally amorphous, forms however two hydrates, with two and six equivalents of water. Besides many distinctive properties which its compounds with organic and inorganic acids possess, it is distinguished at once by a property which singles it out from among all the cinchona bases, viz., *the property of forming a crystallizable product of substitution with iodine*,—the highly interesting Herepathite. By the aid of the microscope Herepath's reaction enables us also to ascertain whether a commercial quinine salt contains, besides quinine, traces of other alkaloids, or crystallizable extractive matter (*salicine, phlorhidzine*.) This reaction requires, however, great practice.

2. **Quinidine.**—An amorphous modification of the quinine, to which it stands probably in a similar relation to that of grape to cane sugar. If Pasteur's observation of a product of decomposition produced by the action of sulphuric acid upon quinine is at all correct, quinidine invariably contains quinicine.

3. **Ordinary Quinidine** (= Quinidine.)—The sulphate of quinidine most frequently (at least formerly) met with is the sulphate of a quinidine. It is of a very different solubility in cold water—from 1 part in 300 to 1 part in 180, *rarely more*. The pure alkaloid crystallizes from spirit in *large, short*, slowly efflorescing, truncated prisms. Tepid ether dissolves mere traces of the base, which crystallize out on standing for a short time. Its presence in sulphate of quinine is, therefore, readily indicated by the ether-test. Many of its salts exhibit, when compared with the corresponding quinine salts, striking differ-

ences in form and solubility, and in the proportions in which they dissolve.

4.  $\beta$  *Quinidine*.—Crystallizes from spirit of wine in fine needles, which effloresce very rapidly, and is far more soluble in ether than the previous alkaloid. Its sulphate forms small brittle needles, and is more soluble in water than the sulphate of  $\alpha$  quinidine (1 part in 110 to 1 in 98.) It possesses the characteristic property of producing an amorphous precipitate with a concentrated solution of iodide of potassium (1 part in 4) in an aqueous solution saturated in the cold, whilst the same reagent produces oily or resinous deposits in aqueous solutions, saturated in the cold of all other cinchona bases, except that of sulphate of quinine. The other salts of  $\beta$  quinidine are more allied to the salts of quinine than those of  $\alpha$  quinidine.

5.  $\gamma$  *Quinidine* is even more soluble in ether than the  $\beta$  quinidine; the solubility of its sulphate is on a par with that of the sulphate of  $\alpha$  quinidine. From its appearance and specific gravity it cannot be distinguished from the pure sulphate of quinine, and iodide of potassium acts upon an aqueous solution saturated in the cold, in the same manner as it acts upon all other sulphates of the cinchona alkaloids, with the exception of sulphate of  $\beta$  quinidine.

The alkaloids of 3, 4, and 5 of Group I. are only sparingly soluble in alcohol of 20° B.

II. Group.—*Solutions of salts of this group of bases exhibit no change of color on the addition of chlorine water and ammonia. The pure alkaloids form no hydrates, but beautiful anhydrous crystals, insoluble in ether, (or at all events far less soluble than the  $\alpha$  quinidine,) and equally insoluble in alcohol of 20° B.*

1. *Cinchonine* is easily distinguished from all the other cinchona bases by the crystalline form and properties of almost all its salts. Its bisulphate is the only cinchona substance which possesses distinct dichroism.

2. *Cinchonidine* (the ordinary) crystallizes from alcohol in hard prisms of a strikingly vitreous lustre. Its salts are generally less crystallizable than those of the bases of the first group and of cinchonine; with hydrochloric acid, however, it forms a very characteristic compound, crystallizing invariably in almost



regular well-formed dense rhomboidal octahedra, (like nitrate of quinine,) whilst all other hydrochlorates of the cinchona bases crystallize in long prismatic needles, often combined in fibrous masses, having the appearance of asbestos. By saturating cinchonidine with sulphuric acid, and comparatively little water, the solution solidifies on cooling, and after some standing leaves a curdy gelatinous magma. Commercial sulphate of cinchonidine is thus frequently found in coherent masses, resembling commercial carbonate of magnesia. The solubility of this compound in water of 15° C. lies between  $\frac{1}{100}$  and  $\frac{1}{96}$ .

8. It appears that there are modifications of cinchonidine, similar to those of the bases of Group I., which might be characterized as separate isomerides of cinchonine. A short time ago I obtained an alkaloid, crystallizing in brilliant little scales or small shining needles, from an amorphous sulphate of cinchonidine, which came from France and was sold under the name of *Sulphate de Quinidine*. It dissolved in 108 parts of water of 15° C., and gave with hydrochloric acid long hard rhombic prisms and no rhomboidal octahedra.

In my endeavor to find out a qualitative quinine test, I thought first of employing the peculiar iodide of potassium reaction, described under  $\beta$  quinidine, with cold saturated solutions of the sulphates of the alkaloids, and succeeded in distinctly tracing, by means of this reagent, an adulteration amounting to as little as 0.3 per cent. of the sulphate of quinine with quinidine (especially with  $\beta$  quinidine;) at the same time I perceived that a qualitative test, based upon the iodide reaction, could not be recommended as a mode of commercial analysis, because the precautions which have to be observed are manifold and difficult, and likely to give rise to erroneous observations. For, the hydriodate and the sulphate of quinine are almost equally soluble in cold water, and it is therefore possible that an aqueous solution of the sulphate saturated in the cold, of a perfectly pure quinine, is rendered slightly turbid on the addition of iodide of potassium, if the latter be a little too concentrated, or if one or the other of the solutions shows a different, i. e. a lower temperature than 15° C. Moreover, the iodide of potassium of commerce is rarely absolutely free from carbonate of potassa or caustic potassa, which renders the test troublesome for those

who have first to prepare the perfectly neutral reagent. Sulphate of quinine, containing traces of free sulphuric acid, (in the case of its having been recrystallized from strongly acidulated water) is thereby rendered more soluble, and since all solutions of quinine salts, which are more soluble, are precipitated by iodide of potassium, the result of the test would in that case be faulty. In the presence of very slight traces of foreign alkaloids a large excess of the reagent frequently dissolves the precipitate as rapidly again.

Several years ago Howard proposed to employ the slight solubility of the sulphate of quinine in cold water as a criterion of its purity; but the solubility of even the purest sample varies, and is not at all constant, and this mode of testing might, therefore, in some cases, cause the analyst to overlook from 2 to 5 per cent. of quinidine. Accurate determinations of the solubility of organic substances, containing water of crystallization, are not among the easiest of tasks of analytical chemistry, and the possession of a characteristic qualitative test becomes therefore a thing all the more to be desired. A method for the recognition of foreign cinchona bases in sulphate of quinine may, however, be based upon the difference in the solubility of the sulphates of our alkaloids, provided another factor of solubility is taken into account. Dilute solution of caustic ammonia exhibits very different solvent powers with the different cinchona alkaloids. Quinine is dissolved with comparative facility, quinidine with much more difficulty, *s* and *y* quinidine and cinchonidine only slightly, whilst cinchonine is all but perfectly insoluble in ammonia. The solubility of the cinchona bases, in ammonia, stands therefore in an inversed ratio to that of their sulphates in water. Upon this fact is based the following quinine test:—

A. *Solubility of the cinchona bases in dilute ammonia.*

The dried alkaloids, whether amorphous or crystalline, dissolve very difficultly and slowly, and rarely equally in ammonia; they do not even dissolve in constant proportions when freshly precipitated, and when in a pasty state. I found, however, that they are rendered considerably more soluble by employing ammonia for the precipitation of the alkaloids from their saline solutions, and by adding ammonia in excess till the bases

are redissolved. I have made the following experiments for ascertaining the degree of solubility of the cinchona alkaloids, and I employed two kinds of commercial liquor ammoniæ of different strengths. A, Liq. ammoniæ of sp. gr. 0.92. B, Liq. ammoniæ of sp. gr. 0.96.

1. *Quinine*.—An aqueous solution of pure sulphate of quinine, saturated at 12° to 15° C. contains, as has been pointed out before, not always constant quantities of sulphate of quinine. A great many determinations of solubility, made with pure sulphates, procured from various manufacturers, furnished the proportions 1:770 to 1:788. Most of the sulphates were soluble in 750 to 755 parts of water of 15° C., and these numbers may therefore be taken as average numbers of solubility. According to Baup sulphate of quinine is soluble in 710 parts of water of 13° C.; according to Jobst and Hesse in 793 to 788 parts at from 6 to 9.5° C.

The salt which served for the following determinations of solubility was dissolved in 752 parts of water of 14.5° C.

5 c. c. of this solution was treated in a test-tube with measured quantities of Liq. ammoniæ, till the cloudiness which at first made its appearance had again completely disappeared, when they required

Of Liq. Am., A.	Of Liq. Am., B.
4.5 c. c.	6.6 c. c.
4.6 "	6.5 "
4.8 "	6.8 "
4.7 "	6.6 "
4.6 "	6.8 "
4.8 "	6.7 "

Samples of pure sulphate of quinine, which were a little more soluble, required a few tenths more of both test-liquids, but I never met with a pure salt which required more than 5 c. c. of the test solution A, and 7 c.c. of the test solution B, per 5 c. c. of the sulphate solution.

It will be a safe course, therefore, to adopt in every case the last mentioned limits of solubility as a basis in the estimation of common quinine salts.

2. *Quinidine*.—The solubility in water at 15° C. of the

sulphate of a quinidine, employed for the following experiments, was 1 part in 228. 1 c.c. of a solution of the sulphate saturated in the cold, when treated with the above test solutions of Liq. ammoniæ, till the precipitate which appeared at first had completely redissolved, required

Of Liq. Am., A.	Of Liq. Am., B.
10.7 c. c.	12.6 c. c.
10.8 "	12.8 "
11.0 "	12.7 "
11.0 "	12.8 "
10.9 "	12.8 "

1 c. c. therefore requires from 10.5 to 11 times more of the test-liquor A than a corresponding quantity of a solution of sulphate of quinine saturated in the cold.

3. *β* *Quinidine*.—Solubility of the sulphate in water of 15° C.

(a.) of a sample prepared in the year 1859, 1: 112.

(b.) of a sample prepared in the year 1860, 1: 105.5.

1 c. c. of a solution of these samples, saturated in the cold, required, in order to produce the above reaction—

Of Liq. Am., A.	Of Liq. Am., B.
For sample A, on an average 14.3 c. c.	on an average 15.2 c. c.
" " B, " " 14.6 "	" " 15.6 "

or about 12 times more than a solution of the pure quinine salt. After standing for half an hour the ammoniacal solution became turbid, and the alkaloids separated, probably completely, in the form of small granular crystals, which were not redissolved even in a large excess of  $\text{NH}_4\text{O}$ .

4. *γ* *Quinidine*.—Solubility of the sulphate in water of 15° C. =  $\frac{1}{205}$ .

1 c. c. of a solution, saturated in the cold, required on an average of Liq. am. A, 10.9; of Liq. am. B. 12.5.

5. *Cinchonidine*.—The sulphate of cinchonidine of commerce contains frequently considerable quantities of quinidine, sometimes also traces of quinine. Its insolubility in water of 15° C. varies from  $\frac{1}{98}$  to  $\frac{1}{110}$ .

1 c. c. of a solution of the sulphate of cinchonidine, saturated in the cold, required on an average of Liq. am. A, 16 c. c.; of

Liq. am. B, 15.9—16.2 c. c., or from 12 to 13 times more than 1 c. c. of a solution of sulphate of quinine.

6. *Cinchonine*.—Water of 15° C. dissolves  $\frac{1}{54}$  of its own weight of sulphate; 0.5 c. c. of this solution remains turbid even after the addition of as much as 150 c. c. of either of the ammoniacal test-solutions. The alkaloid separates in large flakes, which become finely divided when the liquid is shaken, imparting to the solution a slight opalescence, and which are slowly deposited at the bottom of the test-tube when allowed to stand quietly for a short time, since the alkaloid had never been dissolved, but merely suspended as a finely divided precipitate in the liquid.

By adding, however, from 1 to 6 drops of solution of cinchonine to about 30 to 55 c. c. of a solution of sulphate of quinine, and treating 5 c. c. of this mixture with 5 c. c. of test-liquor A, or 7 c. c. of the ammonia solution B, the cinchonine is at first dissolved, because it is precipitated, together with quinine, in a finely divided state, and because ammonia then acts more readily upon it. After the lapse of an hour, however, flakes of precipitated cinchonine again make their appearance, even in this mixed solution.

#### B.—PRINCIPLE AND APPLICATION OF THE QUININE TEST.

According to A., ex. 1, we may take it as an established fact, that 5 c. c. of an aqueous solution of pure sulphate of quinine, saturated in the cold at 15 c., do not require more than 5 c. c. of the ammonia solution A, and 7 c. c. of the ammonia solution B, in order to become precipitated and redissolved.

This quantity of ammonia is however insufficient, as was proved by experiments 2, 3, 4, 5 and 6, whenever the sulphate of quinine contained larger or smaller quantities of the sulphate of  $\alpha$ ,  $\beta$ , and  $\gamma$ , quinidine, cinchonidine and cinchonine. The last named salts are dissolved, first, by digesting with water any quinine salt which is suspected of having been adulterated by these admixtures. They can be traced with great accuracy by adding just 5 c. c. of the test fluid A, or 7 c. c. of fluid B, to 5 c. c. of an aqueous solution saturated in the cold, of a sample of the mixed sulphates which has to be tested for these less

valuable salts. Even very slight traces of the foreign alkaloïds which escape detection by the ether method, may be recognized in the solution by the opalescence of the mixture, provided the experiment is properly carried out.

2. *Test Fluid*.—If Liq. ammoniæ of the strength ordered in the London Pharmacopœia, that is, of sp. gr. 0.960, is at hand, it may serve as a test-fluid; it is more accurate and safe, however, to standardize an ammonia solution of unknown strength by means of a standard solution of sulphate of quinine saturated in the cold, and of known purity.

3. *Preparation of the Solution of Sulphate of Quinine required for Analysis*.—It is especially necessary that the distilled water employed should not be warmer than 15° C., since the sulphate of quinine is considerably more soluble in water which is only a few degrees above that temperature. Water possessing this temperature is easily obtained both in summer and winter; if above that temperature, it must be cooled down by placing the vessel containing the quinine salt into fresh spring water. From two to four grammes of the sulphate (which must, of course, be neutral) are agitated in a small beaker with 20 to 40 c. c. of distilled water till they are dissolved to a pasty fluid. After digesting for about half an hour, the whole is thrown on a small filter, either of paper or linen, and squeezed, and the solution thus obtained again filtered till it is obtained perfectly clear.

4. *Qualitative method*.—5 c. c. of this solution of sulphate of quinine are measured out into a dry test-tube, then treated with 5 c. c. of the standard solution of ammonia of sp. gr. 0.92, or with 7 c. c. of a standard solution of ammonia of 0.96 sp. gr., or also with a corresponding number of c. c. of a standard solution of ammonia of different sp. gr., so as to prevent the two layers of liquid from mixing at first as little as possible. The test-tube is then closed with the thumb, and the liquid made to run repeatedly backward and forward, whereby the mixture will be found to have become perfectly clear and free from suspended alkaloid, or will become so after a few minutes. Violent agitation of the liquid in the test-tube is objectionable, because ammonia gas is liberated, and would render the reaction inaccurate. Should the experiment give a doubtful result,—that is,

should the liquid exhibit only a slight cloudiness,—a more concentrated solution of the foreign alkaloids with which the quinine is contaminated is made by digesting a larger quantity of the sulphate of quinine under examination in less water, ex. gr. 5 grm. in 30 c. c. of water. For commercial purposes it will, however, scarcely be required to submit a sulphate of quinine which had been dissolved in the former amount of water and showed no opalescence, or only a slight cloudiness, with the above standard solution of ammonia, to further tests; since a slight cloudiness which disappears on the addition of a few more tenths of a c. c. of the ammonia solution, would scarcely justify one in forming an unfavorable opinion of a sample of commercial sulphate of quinine.

5. *The following numbers were obtained in the Qualitative Analysis by means of a Standard Ammonia Solution:*

Mixture.	Results.
5.0 grm. of sulphate of quinine, and 0.25 " " $\beta$ quinidine. (=5 per cent. impurities.)	An immediate heavy precipitate.
5.0 grm. of sulphate of quinine and 0.05 " " $\beta$ quinidine. (1 per cent. impurities)	Strong cloudiness; after a few minutes a heavy flocculent precipitate.
5.0 grm. of sulphate of quinine, and 0.025 " " $\beta$ quinidine. ( $\frac{1}{2}$ per cent. impurities.)	Strong opalescence; after half an hour's standing a precipitate of $\beta$ quinidine.
5.0 grm. of sulphate of quinine, and 0.01 " " $\beta$ quinidine. (1-5th per cent. impurities.)	A slight cloudiness, which increased in the course of two to three hours, and exhibited a slight but distinct precipitate after four hour's standing.
5.0 grm. of sulphate of quinine, and 0.005 " " $\beta$ quinidine. (1-10th per cent. impurities.)	No reaction; a more concentrated solution ( <i>vide</i> sub. B. 4) showed however a slight opalescence.

Five experiments made with admixtures of corresponding amounts of pure sulphate of cinchonidine to a pure sulphate of quinine gave the same results:

Mixture.	Results.
5.0 grm. of sulphate of quinine, and 0.005 " " $\beta$ cinchonidine. (1-10th per cent. impurities.)	Even a more distinct reaction than in the case of $\beta$ quinidine.

Five experiments of admixtures of 5, 1,  $\frac{1}{2}$ ,  $\frac{1}{5}$  and  $\frac{1}{10}$  per cent of sulphate of cinchonine to pure sulphate of quinine, gave almost equally close results; the separation of the alkaloid

took place, however, for the most part, in flakes, without any previous opalescence.

6. *Quantitative Method*.—There can be no doubt that the ammonia test may also be employed with advantage for the quantitative estimation of foreign cinchona salts contained in sulphate of quinine, for the separation of which hitherto tedious and uncertain methods had to be employed. It will be found the more useful when an actual adulteration has to be traced, or when a so-called *Chinin-sulphuric naturale*,—sulphate of quinine which contains much quinidine,—such as has been frequently met with in commerce lately, has to be examined.

Such samples will have to be extracted with water by a somewhat modified process, viz., by treating about 5.0 grm. repeatedly with small quantities of water, till a portion of the filtrate gives no longer the ammonia reaction. The extraction with water must not be interrupted too soon, and the qualitative test—for which the least possible quantity of the filtrate only ( $\frac{1}{2}$  to 1 c. c.) is employed—ought only to be resorted to when, according to a preliminary rough experiment, it may be expected to give a negative result. The whole of the filtrate is then introduced into a graduated measure glass, and diluted to a round number of c. c. (varying probably from 80 to 100 c. c.) and a measured quantity of the liquid ( $\frac{1}{2}$ ,  $\frac{1}{3}$ ,  $\frac{1}{4}$ , etc.) mixed with the standard ammonia solution in the proportion employed for the qualitative analysis. The precipitated alkaloid is allowed to settle, and then rapidly thrown on a good filter, washed at first with a weak solution of ammonia, and lastly with water, and well dried at 100° C. till its weight remains constant. The results are sufficiently accurate.

7. The following quantitative numbers were obtained: (a.) a mixture of 4.0 grm. of pure sulphate of quinine, and 1.0 grm. of pure sulphate of cinchonine, were separated according to B. 6. Total aqueous extract = 100 c. c.

50 c. c. treated with 52 c. c. of ammonia solution of 0.92 sp. gr. left 0.405 grm. of alkaloid undissolved. 5 grm. of the purposely adulterated quinine salt contained therefore  $\frac{100 \times 0.405}{50} = 0.810$  of a foreign alkaloid (Ci.) or  $0.810 \times 1.217 = 0.986$  of sulphate of cinchonine.

After having ascertained that the foreign admixture consisted of cinchonine or cinchonidine, the weight of the alkaloid



found is simply multiplied by 1.217 in order to find the amount of sulphate present, or in the case of quinidine, etc., by the factor 1.338.

A mixture of 4.80 grm. of pure sulphate of quinine, and 0.20 grm. of pure sulphate of quinidine, were separated in a similar manner. Total amount of filtrate = 50 c. c. 25 c. c. were precipitated with 35 c. c. of the standard ammonia solution of 0.96 sp. gr., and gave 0.072 grm. of a precipitate  $\frac{50 \times 1.338 \times 72}{25} = 0.1919$  instead of 0.20.

If the composition of the foreign sulphate is not known—which is generally the case—it will be safer simply to compare the quantity of the free base found with the average percentage of pure sulphate of quinine = 75 per cent. (Freshly re-crystallized sulphate of quinine, dried by pressure between filter paper without application of heat, contains 73.5 per cent. of quinine.)

8. *Examination of other Official Cinchona Salts.*—It is evident that the ammonia test can be employed likewise in the estimation of cinchona compounds, which are more soluble than sulphate of quinine, of course by employing other proportions for their mixtures. 1 c. c. of pure hydrochlorate of quinine requires ex. gr. 22 c. c. of the ammonia solution of sp. gr. 0.92 for its precipitation, and in order to re dissolve the alkaloid in excess, whilst solutions of other hydrochlorates of the cinchona bases cannot be re-dissolved, even on adding a large excess of ammonia. In examining these readily soluble salts it becomes necessary, however, first to dilute measured quantities of solutions, saturated in the cold, with water to the proportion in which sulphate of quinine is soluble, before adding the ammonia solution, since ammonia precipitates quinine from concentrated saline solutions, in lumps which are as difficult to re-dissolve when they have once been precipitated, as are the foreign bases.—*London Pharm. Journ.*, July, 1862, from *Zeitschrift für Analytische Chemie*.

#### A PROCESS FOR ESTIMATING TANNIC ACID IN GALLS.

By MR. J. H. MARRIAGE.

Observing that your number for the present month contains a process for estimating Tannic Acid, I venture to send you de-

tails of another method, which will, I think, be found equally simple, more accurate and much more convenient than can be the case with one depending on hydrometrical measurement. It must be remarked, however, that the method now described is not applicable to *all* substances containing tannic acid, as its indications with regard to catechu and myrobalans are not to be relied on, owing, probably, to the presence of some other acid possessing the power of precipitating salts of copper. Gallic acid has not this power, and its presence is therefore no obstacle to a satisfactory experiment. With galls this process gives accurate results, as I have seen proved by careful comparison with the centigrade gelatine process.

The solution I employ is one of ammonio-sulphate of copper, containing in each decem 684 grains of crystallized sulphate of copper, and just sufficient liquid ammonia to re-dissolve the precipitate first occasioned. Two septems of this solution indicate one grain of tannic acid. It occasions an olive-green precipitate, and at the same time deepens the color of the liquid operated on. As the experiment approaches completion, the color again becomes fainter, and with perfectly pure tannic acid would probably vanish altogether.

It is at first almost impossible to filter the liquid, but when the proper quantity of the copper solution has been added, the precipitate is readily separated. No great excess of copper can be put in unobserved, owing to the intense color of the test solution. I find it most convenient to exhaust the powdered galls with water in the proportion of a decem to 100 grains, and, in that case, if half the liquor be operated on at once, the number of septems of test solution employed directly indicates the percentage of tannic acid.

This method, while equally accurate, has several advantages over the gelatine process. Owing to the color of the precipitate, it is more readily employed by artificial light. A smaller quantity of test solution is required, for it is impossible at ordinary temperatures to employ a gelatine solution much stronger than so as to require *ten* septems to precipitate one grain of tannic acid, consequently the alkalimeter may require re-filling several times, occasioning loss of time and liability to error. Lastly, the copper solution may be kept for a long time

unchanged, while a solution of gelatine cannot always be depended upon even the day after it is made.

I observe that Fownes estimates the tannic acid in galls at from 30 to 40 per cent., whilst Royle puts 60 per cent. as the maximum. My own experiments lead me to be dissatisfied with blue galls containing less than about 65 per cent. A sample of Chinese galls contained 52 per cent.—*Pharm. Journal*, April, 1862.

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### ON THE PREPARATION OF PURE CAUSTIC SODA ON THE LARGE SCALE.

By Dr. PH. PAULI, of the Union Alkali Works, St. Helens, Lancashire.

Three tons of commercial caustic soda, containing excess of water, alumina, and all the impurities which commonly occur in this substance, are fused in a cast-iron pot. During the evaporation nearly all the carbonate, and by far the larger quantity of the other salts, separate out on the surface as a scum, and can be easily removed. The liquid mass is then heated to dull redness, and kept at that temperature during the night. In the morning the mass appears perfectly transparent, the sides and bottom of the vessel being coated with cauliflower-shaped masses of crystals consisting of silicate of alumina, with chloride and sulphate of sodium and a little lime. The clear fused liquid is ladled off from these crystals, and when cooled is ready for use.

The soda thus obtained is perfectly free from alumina; a small quantity of the soda was fused in a platinum crucible, and some pure alumina added. This remained undissolved in the fused mass, swimming about like a precipitate in the red-hot liquid. On cooling, water was added to this fused mass, and the alumina was found to dissolve completely. If the commercial soda contains oxide of iron, this also separates out completely during the process of fusion. Lime, on the other hand, is dissolved in large quantities by the caustic soda, but it is completely separated by solution in water. The caustic soda prepared in this way is hard and brittle, and can be easily obtained as a fine powder by attrition in an iron mortar. It contains only a trace of carbonate of soda. This product, which will

doubtless prove a valuable reagent in chemical laboratories, is now prepared on a large scale by Messrs. Evans and M'Bryde, Union Alkali Works, St. Helens, Lancashire.—*Chem. News*, London, June 28th, 1862.

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ON THE APPARENT DIFFICULTY OF DETECTING STRYCHNIA IN  
THE PRESENCE OF MORPHIA—DISCOVERY OF A MORE  
POWERFUL REAGENT FOR STRYCHNIA.

By JOHN HORSLEY, F. C. S., Analyst for the County of Gloucester.

The first part of the title of this paper has reference to that of Dr. Reese, contained in the "Chemical News" for June 7. It is very true, as stated by Dr. Reese, that morphia in excess has the power of preventing the effect of chemicals upon strychnia, as ordinarily practised; but the difficulty of detecting it is more apparent than real, all that is necessary being (if the two alkaloids have really been extracted from a dead body) to adopt the method of precipitation of strychnia by the addition to the concentrated aqueous or neutral solution of a few grains of neutral chromate of potash, as suggested by me at the British Association for 1856, aiding the formation of the golden-colored crystalline precipitate by brisk agitation for a minute or so with a glass rod, then carefully decanting the supernatant liquor containing the morphia (the chromate of which is longer forming;) or it may be passed through a very small filter, and the chromic salt of strychnia collected for experiment with strong sulphuric acid, the merest particle of the salt being sufficient. Under the microscope, the crystals of chromate of strychnia are in the form of little golden-colored stars; but the corresponding salt of morphia is that of little round granules, with a dark ring on the outside. As a matter of course, these latter, when touched with sulphuric acid, turn green, and so, when in excess, have the effect of masking the reaction of strychnia, which remains passive.

As regards the new reagent,—that is, the nitro-prusside of sodium,—which I used quite by chance the other day, and was astonished at the result, a comparison between it and the bi-chromate of potash is immensely in favor (where no other alkaloid but strychnia is present) of the nitroprusside, the extreme

limit of detection being  $\frac{1}{100000}$  th; indeed, 75,000 is quite marked, but the bichromate scarcely reaches 8000. There is also a greater degree intensity as well as persistency of color, nor is there any disposition to that greenness as observed in the reduction of chromic acid; and, as far as I can see, it is entirely free from objection, and commends itself as *the test par excellence*. It is useful as a precipitant of strychnia, the crystals being in the form of very long spiculæ, and sometimes needles, which strike a splendid color with sulphuric acid.

I arrived at the test figures thus:—1 grain of strychnia was first dissolved in 100 of water. Of this solution, 1 drop was added to 999 of water; a fragment of nitro-prusside was then thrown in, and agitated till dissolved. Of this mixture, 1 drop was let fall into a small white-ware dish, and dried at a steam heat, and on cooling the color was developed by drawing across the spot a glass rod dipped in sulphuric acid.—*Chem. News, London, June, 21, 1862.*

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#### ON THE NITRO-PRUSSIDE OF SODIUM AS A TEST FOR CERTAIN ALKALOIDS.

By JOHN HORSLEY.

Since announcing the above test I find by using it in the manner stated, that the plea for the non-detection of strychnia in the presence of morphia no longer holds good, as subsequent experiments with five and even ten times the amount of morphia prove.

I find also that one drop of a solution of strychnia of one per cent. strength, agitated with one or two drops of a saturated solution of the nitro-prusside, produces an abundant crop of crystals for an infinitude of experiments with sulphuric acid,—the crystals under the microscope being in long nitre-shaped tufts and needles. A similar experiment with brucia produces larger and broader needles having lancet points, totally different from strychnia, besides being different in its reaction with sulphuric acid.

A similar experiment with morphia also shows certain characteristics; thus, the crystals are for the most part of a peculiar

star-fish shape for the larger compound crystals, which appear to be made up of plates or layers of single squares.

These crystals when collected on a filter and dried, produce the usual orange-red colored reaction with nitric acid, but unlike pure morphia, when touched with sulphuric acid, assume a deep sepia brown with a purplish shade, which is more or less persistent,—totally different from the reaction on any other alkaloid.

Possibly, by applying this test to some other alkaloids, we may obtain some useful characteristic by which they can be recognised better than by some of our present methods.  
—*Chem. News, London, June 28, 1862.*

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#### THE CINNAMON GARDENS OF CEYLON.

The traveller who visits Colombo will scarcely fail to enter the cinnamon gardens, in order to enjoy the delightful, peculiar odor of the bark of this remarkable bush, which plays such an important part in the history of Ceylon.

During the prosperous period of the cinnamon culture, the five largest cinnamon plantations on the south-western part of the Island had a circumference of fifteen to twenty English miles. To a considerable degree all the other profitable productions of the Island were neglected. The cultivation of cinnamon—a monopoly of the different governments which have successively ruled and plundered Ceylon and its inhabitants—was carried on particularly by the Dutch East India Company with barbarous rigor. The smallest theft of cinnamon, or intentional injury of the tree, was punished with death. For breaking off a branch, the penalty was cutting off the arm. Every plant which accidentally grew in the garden of a private citizen was the property of the government, and the cinnamon-gatherer or cinnamon-peeler had the right to collect its bark. To disturb such a plant,—even although but to transplant it,—was a crime to which life was a forfeit. The workmen who were engaged in collecting, peeling and preparing the bark, belonged to the caste of the Chalias,—the lowest class. Even under the English rule this monopoly of cinnamon, so injurious to trade, continued, until it was finally abolished in 1832, and the merchants of Columbo and Galle were able to

participate in the trade of this important article of commerce by paying an export duty of three shillings per pound. This tax, however, appeared much too high, since the selling price of the cinnamon in Europe was but six to seven shillings, and this advance in price stimulated foreign merchants to supply their wants with other kinds of cinnamon—from the *Laurus* and *Cassia*—obtained in Cochin China and Java.

When finally the government recovered from its delusion, and reduced the export duty to one shilling, and finally entirely relinquished it, the different substitutes for that cinnamon which appeared originally to belong to the Island of Ceylon\* alone, as a natural monopoly, had already on account of their much greater cheapness, found an entrance and sale in Europe, and the culture of the finer sorts became yearly less profitable. The price fell, and the consumption diminished. Only the inferior kinds paid for exportation. And, strange to say, these inferior and cheaper sorts now began to supplant the *Cassia* in the English market, as during the high prices of the monopoly the cheap *Cassia* had supplanted the much esteemed true cinnamon. At the present time only 14,000 to 15,000 acres of land are under cultivation, most of which are in private hands; they yield annually from 800,000 to 900,000 pounds of cinnamon, worth from £40,000 to £50,000.

The Chalias are now no longer—as formerly under the Portuguese and Dutch—serfs or slaves attached to the soil, and liable to be sold with it; but free laborers, entitled to receive an adequate reward for their services.

The cinnamon gardens in the neighborhood of Colombo, although for the most part in a decline, still give to the whole district an extraordinarily gay and lovely appearance. The shrubs four to six feet high, with their delicate, beautifully green laurel-like

\*Sir Emerson Tennent, however, in his work on Ceylon, disputes its being a native of this island. In no European or Asiatic author is mention made of cinnamon as a production, or as an article of trade of Ceylon, until the end of the thirteenth century. Although in the earliest times it was introduced into Europe from Africa by way of Arabia, yet the merchants trading with the island first had knowledge of the appearance there of this valuable spice about the twelfth or thirteenth century. The learned author considers Africa as its native country.

leaves and light yellow flower stalks, set off by the snowy white sandy alluvial soil in which they best flourish, appear doubly fresh and vigorous. The time of blooming is in January; the fruit ripens in April, when the plant is the richest in sap. In May the peeling of the branches begins, and it lasts till October. The cutting and gathering of the shoots, one year old, and as thick as the thumb, is very troublesome, and requires many hands. Each workman cuts off as many branches as he can carry in one bundle, and then with the point of a curved knife skilfully loosens the bark from the wood, and with great care peels off the gray epidermis and bast tissue, and lays the stripped, parchment-like cinnamon in the sun, when it dries and rolls up. An uncommonly delicious, aromatic perfume hovers around the spot where the peeling of the bark is performed, like that exhaled on the breaking of a twig or a leaf. Whatever travellers, however, may relate of the odor of the groves as wafted to them at sea for a considerable distance, yet it would appear that this agreeable smell arises much more from other aromatic productions in which the island is so rich, than from the cinnamon, which yields it only to its immediate neighborhood. The best kind of cinnamon is as thin as strong paper, delicate, brittle, of a fine golden yellow color, sweet and spicy; the coarser sorts are thicker, of a darker brown color, pungent, biting, and leaving in the mouth a bitter taste. In the store-houses the cinnamon is sorted, the quills placed inside of each other, packed in bundles of four feet in length, and sewed up in packages of ninety pounds weight. In all the crevices and interstices of the package a considerable quantity of pepper is strewed, in order to preserve the cinnamon during the transportation, whereby both spices are improved. The black pepper attracts the excess of moisture, and refines the odor of the cinnamon.

In consequence of the decline of the cinnamon culture, attributable to the change of taste among the people, and thereby to the comparatively trifling consumption of the spice once so highly valued, the cultivation of coffee in Ceylon has increased ten-fold in the last twenty years, and the want of laborers is the only cause, that with the remunerative profit it affords, it has not increased still more.—*Vierteljahresschrift für praktische Pharmacie.*  
G. J. S.



ON THE PREPARATION OF IODIDE OF POTASSIUM, AND  
SOME OTHER IODIDES.

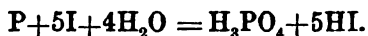
By W. STEVENS SQUIRE, PH.D., F.C.S.

I propose to bring under your notice this evening a beautiful process for the preparation of iodide of potassium, which has lately been devised by Baron Liebig, and I shall take this opportunity of making some practical remarks upon this process, and on some other points connected with the iodides employed in medicine.

Of the many processes which have been recommended for the preparation of iodide of potassium, I believe only three have been found at all practical:—1. A solution of iodide of iron or zinc is decomposed by a solution of carbonate of potassium. 2. Iodine is added to a warm solution of hydrate of potassium; the color disappears with a formation of iodide and iodate of potassium, the solution is evaporated to dryness, and heated with charcoal, which reduces the iodate to iodide. 3. Iodine is added to a solution of sulphide of barium; in this case sulphur is precipitated, and iodide of barium is formed. This solution is boiled with powdered sulphate of potassium; iodide of potassium then remains in solution, and may be filtered from the insoluble sulphate of barium. This last process has the great disadvantage that the product is rarely, if ever, free from sulphur compounds, and is rather inclined to blacken when heated; in other respects it is a beautiful preparation, and is very free from sulphates, chlorides, and other impurities generally found in iodide of potassium. In the first two processes purified pearl-ashes are used instead of pure carbonate of potassium, which is too expensive for the purpose. In this way the various impurities of the potashes find their way into the iodide of potassium, or the mother-liquors must be rejected, and the iodine recovered from them, which is not found to be an economical plan.

In order to meet these objections, Baron Liebig has proposed the following mode of preparation: 1 part of phosphorus is placed in a basin, and covered with about 40 parts of hot water, and 20 parts of iodine are gradually added, with frequent stirring; violent action takes place, and a great portion of the

phosphorus is converted into the amorphous variety, which however in no way interferes with the process, as the amorphous phosphorus reduces the iodine just as well, though not quite so fast. The colorless liquid, which consists of a solution of phosphoric and hydriodic acids,



is then poured off from any excess of phosphorus, and milk of lime is added until the mixture becomes alkaline; the whole is now brought upon a linen filter, and the precipitate, which consists of phosphate of calcium, is pressed and washed; the filtrate contains nothing but iodide of calcium, and is now to be boiled down with twelve parts of sulphate of potassium in powder (this quantity is not quite sufficient to decompose the iodide of calcium). When concentrated to about half, the whole is allowed to cool and remain at rest for six hours, and then filtered, the precipitate being pressed as before. A small quantity of PURE carbonate of potassium is then added to the filtrate, which removes every trace of lime, and the filtered solution now yields, on evaporation, crystals of pure iodide of potassium. A quantity of iodide of potassium, prepared in this way by Pettenkofer, yielded almost the theoretical quantity. By a modification of this process we may prepare the iodides of sodium, lithium, barium, strontium, calcium, magnesium, manganese, ammonium, etc. etc.

In repeating Liebig's experiments I find the iodides prepared in this way very easily acquire a peculiar pinkish hue, and that it is very difficult to get them to crystallize properly; what the cause of this is, I do not know, but the objection is completely removed by fusing the salt before crystallization,—the iodides after this treatment crystallize beautifully, and retain their color remarkably well. A specimen of iodide of ammonium prepared in this way, by fusing the iodide of barium, was found to have no superior as an iodizer for photographic purposes; and this is perhaps the best test of its purity. With this slight modification, I think that the process of Baron Liebig is one of the best ever proposed for the manufacture of iodide of potassium; the potassium salt used is at once the cheapest and the purest, and the only other item of cost in the materials is the

phosphorus, but one ounce of this body is sufficient for the production of one pound and a half of iodide of potassium, so that it only costs about one penny for every pound of iodide manufactured by this process.

### *Proto-iodide of Mercury.*

The Pharmacopœia directs, for the preparation of this compound, that eight parts of mercury should be rubbed with five of iodine, with the addition of a little spirits; the powder thus produced is of a dull olive color, and consists of pure iodide of mercury. There is found in commerce a powder of a beautiful brilliant yellow color, which sails under the name of iodide of mercury, and which is often preferred to the pharmacopœial preparation, on account of the beauty of its color. This brilliant powder is prepared by precipitation from the proto-nitrate of mercury, but as this salt is insoluble unless a certain proportion of nitric acid is present, the free nitric acid so acts upon the iodide at the moment of its precipitation that the product is contaminated with a certain proportion of biniodide.

The presence of this last is conveniently proved by heating a sample of the yellow iodide with a little aniline, which possesses the property of producing the well-known magenta color when treated with a persalt of mercury. The pharmacopœial preparation, if no excess of iodine has been used, does not exhibit this reaction. As the biniodide of mercury is so much more powerful in its action than the protiodide, the substitution of the yellow for the pharmacopœial preparation is highly objectionable and might be attended with danger.

### *Periodide of Iron.*

It would have been hardly worth while to bring this subject under the notice of the Society, if it were not according to the handbooks of chemistry still a moot point, whether the periodide of iron exists or not.

To determine this question, a quantity of iodine was divided into three parts; two of these were combined with iron so as to form a pale-green liquid, the third portion was then added, and the whole boiled so as to promote combination. After the dark-brown solution had cooled, it was shaken up with about three

times its volume of ether. In a little time the whole of the ether was found floating upon the water, and had carried with it the whole of the iodine, leaving the iodide of iron dissolved in the water, from which carbonate of ammonium threw down the white carbonate of iron. This experiment pretty conclusively proves what our President asserted in the "Philosophical Magazine," in July, 1836, viz. that the periodide of iron had no existence, and that the brown solution obtained by exposing a solution of iodide of iron to the air was nothing more than a solution of iodide of iron with some free iodine.—*London Pharm. Journ., May, 1862.*

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ON THE PRESENCE OF RUBIDIUM IN CERTAIN VEGETABLE SUBSTANCES (BEET-ROOT, TOBACCO, TEA, COFFEE, GRAPES).

By M. L. GRANDEAU.

On the 24th of February last, I had the honor to communicate to the Academy the results of my researches on the presence of rubidium in the salts from beet-root, and in the mother-liquors obtained from treating them for the extraction of chloride of potassium. Since then I have actively pursued this research, both in the laboratory of the upper Ecole Normale and also in the important factory of M. Lefebvre, distiller at Corbehem, who has kindly placed at my disposal the substances necessary for extracting chloride of rubidium on a larger scale.

Thanks to this assistance, I now possess 400 grammes of pure chloride of rubidium, about half of which has been prepared at the factory at Corbehem, according to my instructions, by the assistance of M. Martel, a skilful young chemist attached to M. Lefebvre's establishment.

When presenting to the Academy, at a subsequent sitting, the new salts of rubidium which I had been able to prepare from the pure chloride at my disposal, I will describe the processes which I have employed for the extraction of the chloride, and will show by the aid of a few figures that the quantity of rubidium annually removed from one hectare of land by beet-root is an amount not to be neglected from an agricultural point of view.

I now propose to submit to the Academy some new results,

proving the great dissemination of rubidium in nature. Having found the new metal in the salts from beet-root, which it is known are very rich in potash, it seemed of interest to seek for it in other vegetable substances, which, by the readiness with which they remove potash salts from the soil, more or less approach beet-root in this respect. I will confine myself in this extract to point out the analytical results which I have obtained, omitting the methods of separation and analysis given in my memoir.

1. *Tobacco*.—I have at present only examined the leaves from Kentucky and Havanna. M. Schlesing, Directeur de l'Ecole d'Application des Tabacs, has been good enough to evaporate to dryness in his laboratory a certain quantity of water which had been used for the prolonged washing of Kentucky leaves. The ignited residue was tolerably white, spongy, and very rich in potash. On spectral analysis this residue gave the characteristic lines of lime, lithium, potassium, and rubidium. The quantity of lithia was very slight. There was, on the other hand, a notable quantity of rubidium.

Leaves from Havanna, best quality, were carefully burnt; their ashes gave me on analysis results identical with those obtained from the Kentucky leaves.

2. *Coffee and Tea*.—Coffee and tea completely and carefully incinerated left ashes rich in potash. An examination of these ashes, after appropriate treatment, showed in each of these products considerable quantities of rubidium, but not a trace of lithium. Coffee is much richer in rubidium than tobacco.

3. *Grapes (crude tartar)*.—M. Kestner, of Thaun, has kindly sent me, at my request, some mother-liquors obtained in the treatment of crude tartars. These liquids were freed from organic matters and foreign substances which they contained, and the residues then submitted to spectral analysis. I am able to state definitely that they contain rubidium, but in very small quantity.

It appears certain from these facts that rubidium is one of the most widely distributed simple bodies in nature. The most different vegetable bodies from the most distant localities remove it from the soil. Moreover, it is evident from my researches that the presence of rubidium is not necessarily allied with that

of lithium, as might have been imagined from the analyses of minerals and waters in which M. Bunsen has discovered this metal. I ought to add that several vegetable bodies of which I examined the ashes appeared to contain no rubidium, although many of them were rich in potash. I may especially mention as instances the colza, the cacao, the sugar-cane, and some species of fucus.

The dissemination of the new alkaline metal being placed beyond doubt by the researches of which this is a *résumé*, it is of great interest to examine with this particular object the soils in which the above-mentioned vegetables grow. With this view I have undertaken experiments and analyses, which I am pursuing as rapidly as the long and delicate character of these investigations will allow.—*Chem. News, London, June 7, 1862, from Comptes Rendus.*

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#### ON THE CAPACITY OF ARSENIOS ACID FOR BASES, AND ON SOME ARSENITES.

By Professor BLOXAM.

Arsenious acid was usually considered bibasic, but the experiments he had made tended to show that it could neutralise three equivalents of base. He first determined the amount of carbonic acid set free by arsenious acid from alkaline carbonates, and found that at a temperature of 212°F., if the arsenious acid were in excess, two equivalents of arsenious acid displaced one equivalent of carbonic acid; but with excess of the carbonate, one equivalent of the acid displaced two-thirds of an equivalent of carbonic acid. At a red heat a similar result was obtained with excess of acid, but with excess of base one equivalent of carbonic acid was displaced. The action of the acid on the hydrates of the alkalies was next investigated; but under these circumstances the acid was oxidised, hydrogen being evolved. Salts were then prepared by mixing solutions of arsenious acid and alkalies; in this manner the crystalline salt,  $\text{KO}, \text{HO}, 2\text{AsO}_3 + \text{Aq.}$  was formed; the water of crystallisation could be driven off at 212°F., and at a higher temperature the remaining water disappeared, and a biarsenite remained in a beautifully transparent state. A sesqui-arsenite,  $2\text{KO},$

$3\text{AsO}_3 + 3\text{HO}$ , and the corresponding soda salts, were obtained in a similar manner. The silver salt was tribasic, amorphous when first precipitated, afterwards becoming crystalline. There were three lead salts, a monobasic and bibasic salt, and a third which was obtained from an acid solution and had the composition,  $3\text{PbO}, 3\text{HO}, 2\text{AsO}_3$ . The zinc salt was tribasic, even when deposited from an acid solution, and under the microscope was seen to consist of a number of *spheres*. The magnesia salt,  $2\text{MgO}, \text{HO}, \text{AsO}_3 + \text{Aq.}$  the copper salt,  $2\text{CuO}, \text{HO}, \text{AsO}_3$ , and the baryta salt,  $\text{BaO}, 2\text{HO}, \text{AsO}_3$ , had also been prepared.—*Chem. News, London, June 7, 1862.*

# ON THE ARSENIFEROUS SULPHUR FROM THE SOLFATARA OF NAPLES, AND PREPARATION OF SELENIUM.

By DR. T. L. PHIPSON, F.C.S.

This sulphur is of an orange color, only partially soluble in sulphide of carbon, differing in this respect from the crystallised sulphur of Sicily, which I find to be totally soluble in sulphide of carbon. It contains both selenium and arsenic; the latter in considerable quantity. The following is the analysis of an average sample:—

Sulphur	.	.	.	.	87.600
Arsenic	.	.	.	.	11.162
Selenium	.	.	.	.	0.264
					<hr/>
					99.026

Or,

Sulphur	.	.	.	.	80.458
Sulphide of arsenic, $\text{AsS}_3$	.	.	.	.	18.304
Selenium	.	.	.	.	0.264
					<hr/>
					99.026

When heated in a platinum capsule it almost entirely disappears, leaving only a slight trace of a black substance, insoluble in nitric acid, and giving the reaction of silica before the blow-pipe.

Of the 87.600 of total sulphur contained in this substance, 64.26 dissolve readily in *aqua regia*, but the remaining 23.34

per cent. resist the action of *aqua regia*, and were not dissolved after boiling with excess of the latter for upwards of two hours.

The preparation of selenium from this impure sulphur is not difficult. The substance being finely pulverised, is oxidised by *aqua regia*, the solution diluted and filtered, thus separating the sulphur which remains undissolved. A few crystals of sulphite of soda are then dissolved in the liquid, until the latter acquires a permanent odor of sulphurous acid, and the whole allowed to repose for about forty-eight hours, at the expiration of which the whole of the selenium is deposited as a rose-red powder. In this manner from 0.3 to 0.4 per cent. of selenium can be obtained; but if, instead of using *aqua regia* to oxidise the sulphur, the latter be treated with carbonate of soda, and nitre, in the dry way, no selenium at all is obtained.—*Chem. News, London, June 21, 1861,*

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#### PREPARATION OF VERMILLION.

By M. RINGAUD.

M. Ringaud has patented in France the following improvements in preparing this pigment:—

1. Washing with nitric acid to take out excess of sulphur and oxides of mercury.
2. Washing with solution of a mixture of sulphate of potash and caustic potash.
3. Digestion of hydrochloric acid.
4. Boiling in solution of caustic potash, which gives it a more or less violet tone.

The advantage of washing with acids is already known, but the treatment with alkalies is new.

The vermilion prepared by M. Ringaud, after being treated by the various solutions in the systematic order given above, is said to be of unprecedented beauty.—*London Pharm. Journ., May, 1862, from Journ. de Chimie Médicale.*



## OIL OF CAJUPUT AS A MEANS OF DISTINGUISHING BETWEEN AMBER AND COPAL.

BY HARRY NAPIER DRAPER, F.C.S.

Several oxygenated volatile oils, notably those of lavender, rosemary and peppermint, possess the property of softening copal resin in the cold, and of dissolving it at higher temperatures, to a greater or less extent. Oil of cajuput, however, readily dissolves copal at the ordinary temperature, forming a perfectly transparent solution, from which the oil evaporates, leaving a very brilliant coating of the resin. Amber is totally insoluble in oil of cajuput, even at the boiling point of the latter; and, as some of the specimens of copal often simulate and are mistaken for amber, this different behaviour may serve as a ready means of distinguishing between the two resins. I may add, as a fact also possessing some technical interest, that the solution of copal in cajuput oil is easily miscible with alcohol.—*Chem. News, London, April 5, 1862.*

## THE CONVERSION OF LACTIN INTO OXALIC ACID

BY MUCEDINOUS FUNGI.

The following letter from Mr. E. M. Rimmington, Bradford, appeared in the *Lancet* of May 10th:—

Whilst engaged in repeating the experiments of Pasteur respecting spontaneous generation, I have been led to the discovery of a very singular and unexpected metamorphosis in milk by the agency of a mucedinous fungus; the conversion of the lactin into oxalic acid, and consequent formation of oxalate of lime. Believing this to be not only an interesting but an important fact (from its bearing on some other questions,) and having fortunately preserved a record of the experiment, I am enabled to give the entire history of it.

On the 17th of September of last year I poured into a test-glass some milk which had been previously boiled and kept in a flask some months; the milk at the time being perfectly sweet and good. The glass was then tied over with writing-paper and set aside. In the course of eight or ten days afterwards, a few

white tufts of mucor appeared, and gradually spread over the whole surface; the mycelium, as the growth proceeded, penetrating deeper into the fluid, the volume of which slowly diminished as it became consumed by the vegetation.

After the lapse of some months, there commenced at the surface of the milk, and at the under surface of the stratum of floccose mycelium, a zone or stratum of fluid of light-brown color, which slowly increased to a deep coffee-brown. It also increased in amount, until the whole fluid was involved in the change. At the time, I attributed this discoloration to some putrefactive decomposition, and did not examine it. The glass and its contents remained in the window of the laboratory, unnoticed, and uncared for, until a few days ago, when I thought it time to put it to some more useful purpose. Before carrying this intention into execution, it occurred to me that, after keeping it nearly twelve months, it would be as well to examine the ultimate result of the changes it had undergone.

The original quantity of milk was about three ounces; of this, only two or three drachms was left at the bottom of the glass, which, as before stated, was of a dark coffee-color, quite free from smell, and neutral. I decanted it into another glass, and then observed a crystalline sediment. Some of this I proceeded to examine with the microscope, and found it to consist of crystals of oxalate of lime in large and beautiful octahedra and dumb bells. On examining a portion of the mycelium, I found it full of similar crystals, entangled among the filaments and apparently adherent. The entire quantity I obtained may be one or two grains, but sufficient to supply many microscopic specimens. If any gentleman feels sufficiently interested to desire to verify my observations, a specimen will be forwarded on application per letter with stamps for postage.—*London Pharm. Journ.*, July, 1862.

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#### SULPHITES AND THEIR USES.

It is stated by the Florence correspondent of the "Medical Times and Gazette" (June 14,) that a new series of salts have been tried with success by Professor Polli.

The following is a short description of these new remedies:

"1. The sulphite of *soda* is soluble in water, and of an unpleasant taste; dose ʒj. to ʒij. per diem. A solution of 1 to 10 grains may be used for lotions.

"The bisulphite of *soda* is also soluble, but its taste is so bad that it should only be used externally, dissolved in ten parts of water.

"The hyposulphite of *soda* is soluble, and of tolerable taste, Dose gr. x. to ʒij. per diem.

"2. The sulphite, bisulphite, and hyposulphite of *potash* are all soluble; but only the last-mentioned should be administered internally, in doses varying from gr. v. to ʒj. per diem.

"3. The sulphite of *magnesia* is the most soluble of all sulphites, the richest in sulphurous acid, and the least unpleasant to the taste. ʒss. ʒij. may be given per diem in ten-grain doses.

"The bisulphite and hyposulphite would be equally suitable for internal use, but are better dispensed with, as they are, by air and moisture, rapidly changed into sulphite of *magnesia*.

"4. The sulphite of *lime* requires 800 parts of water for solution, while the bisulphite and hyposulphite are easily soluble. These three salts have been given in doses of only gr. iij. to gr. vi. per diem. Signor Polli recommends them in the purulent stage of consumption, where they are, according to him, apt to check the absorption of purulent matter, and to favor the cicatrization of vomicae.

"5. Lastly, the sulphite, bisulphite, and hyposulphite of *ammonia*, are all very deliquescent, and of a pungent taste. They are easily changed into sulphates, and can only be used externally.

"All the sulphites which can be administered internally, may be given either in powder, mixed with sugar, and flavored according to taste; or in edulcorated solutions. The sulphite of *magnesia* and the three salts of *lime* are preferable for internal, the others for external use. The hyposulphites in general have been found to act most slowly, inasmuch as they must first pass into the state of sulphites. They are rapidly decomposed by vegetable acids, but not altered by acetic acid, whence Signor Polli concludes, that during their use all kinds of fruit should be avoided, while vinegar may be allowed."—*London Pharm. Journ. July, 1862.*

## POISONING BY ANILIN.

The following is recorded by Samuel Knaggs, Esq., M.R.C.S., in the "Medical Times and Gazette" of June 7th, 1852:—The man, who was thirty-nine years of age and healthy, was employed in some chemical works in Huddersfield. About noon he was directed to empty four carboys of the nitrate of benzole into a still; and by mistake the last one contained anilin, which is made from the nitrate of benzole. On lifting this carboy, it struck against the edge of the still, and broke: the contents poured over him, and into the ground beneath. None got into his mouth, but the fumes were very freely inhaled. Being anxious to conceal this accident from the knowledge of his employer, he worked hard to remove all traces of it; but in about an hour he was compelled to desist, for "he broke out into a sweat, and felt quite giddy and weak in the head and stomach." He then sat down for half an hour, and walked into the open air and had some tea. Afterwards he returned to the still and again tried to scrape up the spilt aniline, but the fume was too much for him. He felt very ill and unable to work; but he stayed till about five o'clock, when he walked across the road to his home, and went to bed immediately, "feeling very bad in his head and chest." He gradually got worse, and about nine o'clock a medical man saw him. At 11 p. m. I received an urgent message, begging me to come immediately, as he was dying. On entering his cottage I found him in bed apparently at the last gasp. His face and whole body was of a livid, leaden hue; the lips, gums, tongue and eyes of a corpse-like bluish palor; he was taking a gasping breath, as I thought for about the last time. I poured instantly two ounces of brandy down his throat, and then used cold affusion liberally with very good effect. After this, I had his chest, legs, and thighs covered with mustard plasters, and for three hours he took  $\frac{3}{4}$ ss. of brandy every quarter of an hour, and at the seventh minute a strong dose of ammonia and chloric ether; whilst with every third or fourth inspiration I made him inhale strong ammonia. During all this period there was no convulsion; he was perfectly sensible, and able to give a correct account of his feelings, and of the accident. His pulse was extremely small and irregular; but it be-

came fuller under the use of these means, and reached 180. He complained only of the pain in the head and chest, and latterly of the mustard. At the end of three hours the sinapisms were removed, and though the mustard was very good the skin was not at all reddened. I then left him for the night, ordering 3ss. of brandy to be given him every half hour, to alternate as before with the ammonia and chloric ether, and to inhale ammonia frequently. This plan was pursued throughout the night, and by the next morning his livid hue was fading, and he soon got quite well again. The legs, however, being blistered and painful from the mustard, kept him in bed for some days.—*London Pharm. Journ.* July 1862.

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THE TRADE IN LIQUORICE.

By P. L. SIMMONDS, F. S. S.

The increasing importance of the trade and manufacture of Liquorice, induces me to pen a few remarks on this article of commerce. The consumption in England has hitherto been about 1200 to 1500 tons a year, but in North America the consumption had reached 4000 to 5000 tons per annum previous to the war. The reason why so much more was consumed in the States than in England was the much lower rate of duty imposed, and its extensive use in manufacturing tobacco,—liquorice juice being found not only an excellent preservative to the leaf, but also beneficial in mitigating the evil effects arising from the extensive practice of chewing and smoking carried on there.

The chief obstacles to extended consumption in England have hitherto been the high price, the high rates of duty, and the great impurity and adulteration of both foreign and home-made sticks and piping. Henceforward the consumption is likely to increase enormously in the United Kingdom, liquorice-paste having fallen in price from 90s. to 45s. under the influence of the removal of the duty by Mr. Gladstone, and the cessation of demand in America. Liquorice sticks, the best that can be made from Spanish and Italian root, are now sold at 100s., and a very good pure article at 60s. to 70s. made from Levant roots.

According to the experiments of Overbeck and others, the better sorts of liquorice contain from twenty to forty per cent. of foreign substances, which remain behind as sediment, some of the lower qualities having as much as eighty per cent.; hence it would seem that the manufacturers add some powder to the liquorice in order to keep it dry. Besides the proportion of soluble extract, the color and taste may also serve as tests for the quality of commercial liquorice. The solution of some inferior qualities is dark-colored and sooty, and the sediment blackish-brown; whilst that of the better qualities is light-brown, and can easily be extracted. The best sorts of liquorice-juice from Calabria are obtained from Martucci, Ferrara, and Cassano, provided with their stamp; these sorts contain 62 to 67 per cent. of soluble extract, and 17 to 26 per cent. of insoluble dry residue.

Two species of *Glycyrrhiza*, or liquorice, have been employed on account of the sweet underground stem, called liquorice-root: these are *G. glabra*, common or smooth liquorice; and *G. echinatis*, echinate podded liquorice. The rhizomes furnish, on decoction, a dark-colored extractive matter, containing a large proportion of sugar. This is inspissated by boiling to a consistency for rolling into paste, when it is wrapped in bay-leaves, and put into small boxes of a half to one cwt. for confectionery purposes, commonly known as Spanish-juice, or Solazzi.

The root of this plant is the useful part, being replete with a sweet, balsamic, pectoral juice, which is either extracted, or the wood sold in substance. It is much used in all compositions for coughs, sore throats, and as a demulcent pectoral; but by far the greatest quantity is used by brewers. The common liquorice is cultivated in most countries in Europe for the sake of its roots, but in Spain and Italy, and particularly in Sicily and Calabria, it makes a considerable article of commerce with this country. In Calabria, liquorice is chiefly manufactured and exported from Corigliano, Rossano, Cassano, and Palermo. The Calabria liquorice upon the whole is preferable to that coming from Sicily, and the Italian paste to that coming from Spain. Liquorice also grows in great abundance in the Levant. The boiling requires the utmost care and precaution, as the juice takes an unpleasant smell and flavor, if burnt in the least degree.

This paste is manufactured from the month of November till March, the warm season being very unfavorable for it ; so much so, that it is not advisable to ship any in summer, as it easily runs into one mass in the boxes, and then is only to be sold for damaged liquorice. The round sticks are preferable to the flat ones, and the good quality is to be brittle, bright, without pores, and of a good fragrant smell.

In this country about fifty acres are under culture at Mitcham with the smooth liquorice, and much more at Pontefract. Twenty cwt. of root per acre may be reckoned a fair crop. The expenses of taking up the root by the fork costs £10 to £16 per acre.

The same ground will answer for liquorice for many years in succession, but it requires a plentiful supply of manure. No return is obtained until the third, fourth, or fifth year. The roots are usually taken up with a three-pronged fork, and stacked in trenches until wanted. The stacking is effected in a moderately dry and sheltered place, the roots being placed upright, with layers of earth between them, and a layer of several inches thick on the top. In this manner the stock is preserved in good order for several months. They are taken out when wanted, by hundredweights, and before being sent to London are deprived of their crowns by chopping. The fibres and small branches which are removed in trimming are called *offal*, and were formerly dried and ground to powder, and much used by chemists for rolling pills, in order to give consistency and substance to the compound.

This well-known vegetable product was equally familiar to the ancients, who also used it medicinally. Under the name of Pontefract cakes, small liquorice lozenges, stamped with the arms of the town from whence they take their name, are still sold by chemists and druggists.

The foreign root is sometimes imported from San Sebastian and the Papal Territories into London and Liverpool in small bundles of 60 to 70 lbs. each, for the use of druggists. It is grown and manufactured to a considerable extent in the provinces of Seville, Valencia, and Catalonia, in Spain. The liquorice-root grows wild in many parts of Greece, and especially in the province of Achaia, at Corinth, Phthiotas, and Missolonghi,

in great abundance; its quality is considered very good, and has induced many to undertake its manufacture. But the number is now much reduced, owing to the cultivation of the land, which makes the root scarce. One manufacturer at Patras, Mr. George Congos, used to prepare yearly more than 40,000 oques of liquorice-juice. The Greek root is said to be sweeter than that found in Sicily and Spain, hence the juice contains a greater quantity of saccharine matter than that made in Calabria.

The following figures from the Official Trade Returns, show the sources of supply in 1860. The duty, which had been 18s. per. cwt. on Paste from British Possessions, and £1 on foreign make, from 1846, and £1 per cwt. on all kinds of juice from August 26, 1853, was abolished on March 7th, 1860:—

LIQUORICE PASTE.			LIQUORICE JUICE.		
	Quantity. Cwt.	Computed Value.		Quantity. Cwt.	Computed Value.
France.....	757	£2479	France .....	772	£2704
Spain.....	981	3372	Spain.....	101	383
Naples and Sicily...	5707	19,780	Sardinia.....	34	202
Turkey.....	16,790	33,578	Tuscany.....	97	572
Other parts.....	829	2785	Two Sicilies.....	5663	32,807
	<hr/>	<hr/>	Other parts.....	186	792
	25,064	61,994.		<hr/>	<hr/>
				6853	37,460

In France there is an extensive use of liquorice-water, in the promenades and public places, under the name of "Coco." Under the name of "Erqooss" it is also sold extensively as a drink in the streets of Turkey and Egypt, in the manner of sherbet. Liquorice is slightly laxative and cooling, anti-scorbutic, and, unlike other sugars, quenches thirst. The saccharine, or extract of liquorice, is of a very delicate character, and easily destroyed by burning or oxidation on boiling. Recently, under a patented process, the application of the vacuum pan, as in sugar boiling, has been attended with great advantage. The result is a much better article than that made by the rough processes in use in Spain and Italy.

The price of liquorice is very little guide to quality: some foreign brands, and some forgeries of the same, selling at 120s. to 150s., and even 170s., when perfectly pure extract of the root can be had for 50s., and sticks superior to any others at 100s.



Purchasers, to avoid being misled, should examine and satisfy themselves of the actual quality. A rough test, but practically sufficient for all purposes, is that of dissolving and filtering the solution to observe what deposit or sediment remains. The pure extract of liquorice of the shops sold under the name of refined liquorice, is prepared by dissolving it in water, straining and inspissating in the usual manner.

Caution is required on the part of the grocer, that he does not pay £8 per cwt. for an article of less intrinsic value, and containing less glycyrrhizin, or pure extract of the root, than can be obtained for 100s.

A new feature in the trade is the introduction of small sticks, weighing from one to one and a half ounce, sold at retail at one penny and one-half penny per stick, instead of those of larger weight (two and three ounces) sold at a sixpence per stick.—*London Pharm. Journ.*, July 1862, from *The Grocer*.

#### CURIOSITIES OF LEECH CULTURE.

Many of those who have assiduously cultivated the leech have amassed handsome fortunes, the trade being very remunerative. A prosperous merchant, away in some far district of Poland or Wallachia, will keep some two or three hundred of the inhabitants of his district in full employment collecting for him, paying them on the best of all plans, according to their labor—viz., so much a dozen, according to the age and quality of the leeches which they bring to the depot. The animals must be all gathered before the heat of the day sets in, and at once carried home to the capacious reservoirs provided for their reception, where they are at once counted and paid for. Packed in clay or in bags, they are at certain seasons dispatched by fleet conveyances to Marseilles, or direct to Paris, change of horses on the way being insured, when necessary, by liberal payments. The mode of packing the leeches for transport is much the same in most of the breeding districts. Some are placed in boxes—first a layer of moist white clay, then a layer of the little animals, and so on till the chest is full. Some of the merchants pack the leeches in bags as soon as they are taken out of the marshes. Each of these bags contains about sixteen

pounds weight, and it is necessary that they should be hung up for a period till the water is all drained out of them, and then the animal rolls itself up into a kind of ball, and lies in a semi-torpid state till it is, perhaps, revived on its journey by a dip into some half-way pond. The boxes or bags containing the leeches are carried in light wagons divided into necessary compartments. Relays of horses and drivers are always kept in readiness at the various stages of the journey; but, notwithstanding the greatest care may be taken in their transport, immense numbers of the animals are killed. Severe frost or great heat is equally fatal to them.—*Pharmaceutical Journal*, June, 1862, from *Once a Week*.

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#### ON THE DETECTION OF PICROTOXINE.

By JOHN W. LANGLEY, S. B.

The seeds of the *Menispermum Cocculus*, known in commerce by the name of *Cocculus Indicus*, or popularly as "Fish-berries," contain several active organic bodies. One of these, picrotoxine, is eminently poisonous, and, it has been asserted, possesses in small doses a distinctly intoxicating quality. From this cause, and because the addition of the berries to the fermenting mash enables the brewer to dispense with a large amount of the malt which he would otherwise use, they have been largely employed for the adulteration of ale and beer, so much so in fact that it was deemed necessary in England to pass a law prohibiting its use for this purpose. While the composition and properties of picrotoxine have been long known, no process has been hitherto discovered by which it may be detected with certainty and confidence, the only method now employed being the recognition of its crystals under the microscope.

When picrotoxine obtained by any of the methods usually given for its preparation is examined, it will be found to possess the appearance and many of the properties of the alkaloids with which it has been classed, but it differs from them in the essential particular of not combining with acids, but on the contrary, it manifests a decided affinity for bases, and behaves in many respects like a weak acid. Again it differs from them in the fact, that if a salt of an alkaloid is decomposed with potassa,

we can remove the organic base by ether from an aqueous solution, while the same course pursued with picrotoxine would fail to remove any of it from the water, it being positively necessary that the solution should be neutral or acid to enable the ether to dissolve it.

Picrotoxine is soluble in one hundred and fifty parts of cold water, but if a small quantity of caustic alkali is present it will readily dissolve in six or eight times its volume. When this solution is gently heated it becomes yellow, and on platinum at a temperature far below ignition assumes a brick-red color which is distinctive and quite unlike the shade produced by sugar under similar circumstances. Picrotoxine, like sugar and many indifferent organic bodies, possesses the property of reducing certain metallic oxyds. "It changes bichromate of potass to a fine green color." (Gmelin.) "An alkaline solution, of picrotoxine reduces sulphate of copper to the suboxyd." (Otto.) This property, however, is common to too many other substances to be at all distinctive. A far more reliable test is found in oxydation.

If dry picrotoxine and nitrate of potassa are rubbed together in a watch-glass, and a drop of sulphuric acid is added, no perceptible change occurs; but if a strong solution of caustic soda or potassa is poured upon this, a bright reddish-yellow color is communicated to the mixture which partially dissolves and causes the whole liquid to assume the same tint. In this way very minute traces of picrotoxine may be discovered, so small a quantity as  $\frac{1}{5000}$  of a gramme, if pure, being detected with the greatest ease. When as small a quantity as this is used we see the color most distinctly by gently breaking the solid cake of sulphate of potassa which lies on the bottom of the dish; portions of the precipitate will then appear of a crimson or purple hue.

In applying this test it is best to add about three or four times the quantity of nitrate of potash that we have of substance to be examined, and to use no more sulphuric acid than is necessary to moisten the mass. The solution of potassa or soda should be made very strong, and enough added to ensure considerable alkalinity in the mixture after the neutralization of the sulphuric acid.

Other powerful oxydizing agents will produce the same result but not with equal facility; chlorine passed over the moistened crystals, slowly dissolves them, and if we pour the alkaline solution upon them we obtain the same color, or we may substitute chlorate of potassa for the nitrate, the objection to the use of this, however, will be found in its tendency to explode when coming in contact with the acid.

This color, however produced, is not permanent, but will slowly disappear with a rapidity proportioned to the amount of substance taken, but it will always appear with great distinctness when first adding the alkaline solution if any picrotoxine is present.

It is extremely probable that this color is produced from a trace of some nitrogenous body which pertinaciously adheres to the picrotoxine, as, on analysis, traces of nitrogen can be detected; but this body powerfully resists all attempts at separation, for when repeatedly crystallized the picrotoxine still retains a minute portion of it. It can be obtained perfectly free from nitrogen only by dissolving it in potassa, and precipitating it by acids. When thus prepared its properties are the same as before, with the exception of the purple color produced by oxydation and subsequent treatment with alkalies.

There is no substance at present known to the writer which gives this shade of color under these circumstances. There are two, however, which communicate a brownish-yellow to the fluid, and would, if present as an impurity, interfere with the distinctness of the reaction; these are sugar and strychnia; from the first we need suffer no inconvenience as it is perfectly separated in the ordinary method used for isolating the alkaloids; from the latter, picrotoxine is most completely removed by treating an acidulated aqueous solution of the two bodies with ether, the strychnia remaining as a salt dissolved in the water and the ether containing all, or nearly all, of the picrotoxine. To prove this the following experiment was tried. A quart of ordinary ale was divided into equal portions; into one 0.45 gram. of picrotoxine and a little strychnia were introduced, the other was unadulterated; both were acidulated with hydrochloric acid and agitated with ether; the ethereal solutions on evaporation yielded, in the first case, small microscopic crystals of picrotox-

ine mixed with a little extractive matter perfectly free from strychnine; the other yielded extractive matter alone. The test of sulphuric acid and nitrate of potash was then applied; the brownish red color was produced in the first case, in the second there was no change. To ascertain the readiness with which minute quantities of picrotoxine can be detected  $\frac{1}{50}$  of a gramme of it was dissolved in a pint of ale; this was acidulated and treated as above; the ethereal extract furnished ample proof of the poison when tested.

In another experiment the stomach of a cat which had been poisoned was emptied of its contents so that only the picrotoxine absorbed by the coats of the stomach might be extracted. It was treated with alcohol and the solution evaporated to dryness. Acidulated water being poured on the residue, the picrotoxine and a little organic matter were dissolved; being now treated with ether and the solution evaporated, small crystals of picrotoxine were obtained, which, when tested, produced the characteristic red color. A portion of animal matter free from poison treated in the same way gave no discoloration.

In examining a liquid for picrotoxine it should first be rendered acid, then shaken with ether; the residue left on evaporation of the ether examined with the microscope for small prismatic crystals; if a few drops of sulphuric acid diluted with its volume of water are added in the cold, and there are alkaloids present, they will dissolve, only so much picrotoxine passing into solution as is due to the water present, about one part for one hundred and fifty of water. A few drops of an alkaline fluid will dissolve the crystals, and on applying heat the fluid will become first yellow and when more strongly heated will become brick-red. A small portion ground in a watch-glass with nitrate of potassa and sulphuric acid gives a solution which when rendered alkaline by potash or soda becomes a bright-red.—*Amer. Journ. Sci. and Art, July, 1862.*

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#### MANUFACTURE OF ALUMINIUM.

We have repeatedly mentioned to our readers the progress of the manufacture of Aluminium since St. Claire Deville dis-

covered the method of obtaining it on a commercial scale. They have learned to forge aluminium, to file, roll, punch and to engrave it with any design the workman may select. The method of drawing it into fine wire has remained hitherto an unsolved problem, though not for the want of diligent efforts to accomplish it. The superintendents of the two manufactories of aluminium ingots, comprehending the importance of being able to draw this metal into fine wire have made great sacrifices to resolve the problem. They have applied to the manufacturers of gold wire both at Paris and at Lyons, but all their efforts have failed. The aluminium has so little density that its texture is at once broken up and it becomes as friable as glass, so that it leaves upon the draw-plate the superficial molecules which are in contact with the instrument.

The problem of drawing aluminium into wire has, however, just been resolved by M. Garapon, an artisan of Paris, who now conducts the operation in a truly workmanlike manner. He furnishes the aluminium wire at from 60 to 100 per cent. cheaper than silver wire of the same length. The price of aluminium is always about 200 francs per kilogram. For the purpose of drawing it into wire they commence with rods of aluminium of one metre in length and 12 millimetres diameter; these the inventor easily reduces to wires of the size of a hair and many hundred kilometres in length. These products appear in the London Exposition, where are seen articles of lace-work, such as epaulettes, embroideries, textile fabrics, entire head-dresses, with mounting and ornaments constructed entirely of aluminium. These articles are remarkable for their lightness, and they show that a novel manufacture has been created by the new process of drawing aluminium into very fine wire. For the details we must await the result of the London Exposition.—*American Journal of Science and Arts*, July, 1862.

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#### ANTISEPTIC PROPERTIES OF AMMONIA.

By DR. RICHARDSON.

In a paper read before the Medical Society of London, Dr. R. states that his earliest researches were directed to the study of the antiseptic properties of gases, and recalled attention to the com-

munication he had made to the Society on this subject in 1850. His present inquiry and application of ammonia as an antiseptic commenced in 1858. His attention was then directed to the fact, that the presence of ammonia effectually arrested the oxidation of various bodies, and even prevented the action of ozone. Believing that by an extension of the same law animal substances exposed to ammonia could be prevented from putrefaction, he kept blood and portions of tissues in contact with simple ammoniacal vapor, and with results which were most remarkable. Blood in an ordinary stoppered bottle, if charged with ammonia so as to give a faint ammoniacal odor, would retain its freshness and many of its properties for years. Animal structures in like manner placed even so as to be massed together in bottles containing ammonia vapor, would retain their freshness for an unlimited time. Dr. Richardson now showed the following specimens: The lungs of a calf which he had used for lecture purposes for six months, and which had been simply placed under a bell-jar, a little ammonia in solution being put over them from time to time; a pancreas which had been kept for eighteen months in a bottle containing twenty minims of ammonia solution; a kidney showing deep congestion, which had been removed sixteen weeks; a bottle of mixed specimens, including portions of intestine with enlarged glands; a bladder, the inner surface of which was injected; a uterus and ovaries and a pancreas, all of which had been preserved lying close in one bottle for sixteen weeks; also a portion of liver, which had been removed nearly three years; and a cancerous breast, which had been removed by Mr. Spencer Wells eight weeks before. The specimens all retain their freshness, and admitted of dissection and examination as in the recent state. The author then described the method of applying ammonia. It was necessary, in the first place, to trust to the ammonia alone: specimens that were exposed first to spirit and then to ammonia vapor were always spoiled. For the preservation of fluids, such as blood or milk, it was merely necessary to add the alkali in solution in proportion, say of twenty minims, of the strong solution to two ounces of the fluid to be preserved. For tissues the plan was to place the specimen to be preserved in a stoppered bottle or under a bell-jar, such as is used for wax flowers and ornaments,

to place in the jar with the specimen a layer of felt or lint, charged with from ten minims to a drachm of the liquor ammonia fortis, and then to close the vessel or jar secure from the external air. For a luting in such cases soap answered best, or a mixture of soap and red lead. After this description, Dr. Richardson pointed out the practical value of the method. 1st. In conducting post-mortem inquiries it did away with all occasion for hurry. It was now only necessary at an autopsy to be provided with one or more jars, each containing say a drachm of liquid ammonia. The jars might now be filled with specimens, and if the stoppers were put in with care the specimens would retain their freshness for weeks, and even their microscopical characters. The only peculiar change was, that if much fat were present, the alkali formed with it a kind of soap; a fact which explained the formation of adipocire in the dead subject undergoing slow decomposition. For forensic purposes this method of preserving animal structure was perfect, inasmuch as it added no mineral or poisonous matter, and yet secured the part to be examined free from change and from all offensive odor. Not only so, but important pathological changes, such as ulceration of intestine, could be kept under observation and submitted to any number of pathologists. He (Dr. Richardson) had found the system a very useful one, too, for lecture purposes, as it enabled him to show to his class real specimens of disease, such, for instance, as the scirrhus breast now going round, instead of casts or specimens softened, discolored, and indeed destroyed altogether by immersion in spirit. The last point to which Dr. Richardson drew attention had reference to the cause of the antiseptic power of ammonia. Ammonia being a product of decomposition had been looked on commonly as a substance provoking decomposition. But ammonia was truly the most powerful antiseptic known: it acted catalytically by preventing the union of oxygen with oxidizable bodies. An experiment was here performed illustrating this: half a grain of ammonia diffused through 40 cubic inches of air was shown to possess the power of entirely suspending the combination of oxygen with potassium on a surface of paper saturated with iodide of potassium, starch, and solution of oxygen, so long as the paper was presented to the ammoniated air; but so soon as



the paper was removed, the evidence of the combination, indicated by the formation of the blue iodide of starch, was presented. In preserving animal structures in ammonia, the same experiment was virtually carried out; the presence of the ammonia suspended the oxidation. There were other agents which effected the purpose, such as chloroform; but the fact that these agents were indifferently soluble in water rendered them much less effective as compared with ammonia, which combined readily with the water contained in the tissues, and so perfected the preservation to the minutest point. In conclusion, the result presented tended to throw a light on the influence of the ammonias as the producing causes of some diseases, and as the curative remedies in other diseases. The same rule that pertained to dead, pertained to living organic matter. Hence long exposure to ammoniacal vapor, by arresting oxidation, produced extreme anæmia and a low depraved condition of the system, altogether with reduced respiration, reduced appetite, reduced muscular power, and reduced energy. On the other hand, in cases where a rapid oxidation of the body was being determined attended with increase of heat and rapid disintegration of tissue, the administration of ammonia, by arresting these changes, became in judicious hands the most powerful and effective of remedies. It checked decomposition by its action on oxygen; it held the blood fluid by its solvent power as an alkali, and being volatile it inflicted no immediate injuries on the structures of the body.—*Amer. Journ. Med. Sci.*, July, 1862, from *Med. Times and Gazette*, May 10, 1862.

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FABRICATION OF SUGAR.

At the meeting of the Academy of Sciences of Paris held 14th January, 1861, M. Dumas presented in the name of M. Emile Rousseau a memoir on a means of purifying vegetable juices, applied to the making of sugar. In consequence of the immense importance of this work, we publish an extensive analysis of it, for which we are indebted to the kindness of the author.

In the juices of the saccharine vegetables, that of the beet being taken for an example, we find always two kinds of organic substances which oppose the extraction of the sugar. The first belongs to the group of albumenoid and caseoid matters. It

undergoes all the modifications which reagents exert upon the solutions of albumen and casein. The salts of lime, and lime coagulate it. But this latter, whether by its own proper alkaline action it dissolves a portion of the vegetable substance, and holds it in combination, as M. Frenay has lately shown; or whether it liberates potassa or soda, causes the juices treated by it to remain always alkaline after the action of carbonic acid. These two effects are even found united, and there results from them a subsequent change of the syrups, which is especially felt in the low products of the manufacture of sugar.

The second substance is a matter generally colorless as long as it remains in the cells of the plant; but very greedy for oxygen, coloring rapidly under the action of the air, modified very easily by oxidizing agents, so as to be either transformed into that well known brown substance which appears, when vegetable juices are evaporated, or entirely destroyed. This substance, indeed, when it is deprived of all the albumenoid matter, reduces by heat the salts of silver, the binoxide of mercury, &c. By the action of this last material, the solution even takes the natural tint which the juice possesses after long exposure to air.

These facts being established, the data of the problem of the simplification of the making of sugar may thus be stated: We must find, 1st, a substance, generally but slightly soluble, having the power of coagulating all albumenoid substances, without any injurious action either on the sugar, or on the health; which can easily be withdrawn from the juice in case a certain quantity should remain in solution; and finally shall be of low price. 2d, Another substance, of an oxidating power, so to speak, limited; which may by its action either destroy the coloring matter or transform it into the brown substance and then absorb it; in short, shall add to this absorbing action the innocuousness and the low price of the former.

Sulphate of lime in whatsoever state it may be, natural or artificial (raw or calcined plaster), is the substance which appears to me to fulfil all the above indications better than any other material which I have studied. It is neutral, a condition which I regard as indispensable: without action on the sugar, but slightly soluble: it unites to the conditions of harmlessness and low price, a most remarkable property of coagulating the

albumenoid matters of vegetable juices, of that of the beet in particular. This property is such that it requires but a relatively very small quantity of its solution to produce this effect. The operation of defecation can therefore be performed under these excellent conditions, and with but a small quantity of matter; the head is very firm, collects well, and the juice can be drawn off in a proper state of clearness. The sulphate of lime therefore removes perfectly all coagulable matter, but does not touch the coloring matter, so that after the separation of the head, the juice soon colors deeply.

Animal charcoal is almost without effect immediately after defecation; it removes only the matter which is already oxidized, for after its action, the juice whose coloration is much lessened, soon colors again. We want therefore an oxidizing agent which shall do in a short time that which the air produces at length, or which may so modify this substance as to destroy or absorb it. Among the numerous bodies which I have examined in reference to this point, and which I shall not now enumerate, the hydrated peroxide of iron presents superior advantages in all respects.

Thus, after having removed by the sulphate of lime all the coagulable matters of a saccharine juice, if we agitate it either cold or heated to a temperature which must never reach ebullition with hydrated peroxide of iron, the filtered liquor passes altogether decolorized, and purified from almost all the foreign matters which it contained. Besides this, the peroxide of iron, by that property, which all chemists know it to possess, of absorbing the alkaline and earthly salts, removes the small quantity of sulphate of lime which remained in solution. Thus the juice which, after the defecation by the sulphate of lime, reduced the nitrate of silver, &c., causes no change in them after its contact with the peroxide of iron.

This juice, when it comes from a plant in the normal condition, is, after this purification, perfectly neutral to test-papers, and may be kept in contact with the air for several days without undergoing the slightest alteration or coloration, which proves that all the matters which could act as ferments have been removed. It boils very well, and does not color even by the action of heat. The syrup when concentrated to the proper point

possesses only that slight yellow tint which belongs to the purest syrups. It tastes well, is deprived of the saline and disagreeable taste which we find in all beet-syrups, and preserves a remarkable fluidity and limpidity. The crystallization takes place easily and the crystals are white.

As a final proof of the good purification of the saccharine juice by this method, if we add to a boiled syrup a proper quantity of water to bring it back to 25° or 30° of the areometer, and in that state mix it with a large excess of alcohol at 90°, no cloudiness or deposit takes place even after several days; it no longer retains a trace of iron.

Henceforth, the making of sugar is reduced to these manipulations only: heating the saccharine juice in a boiler with some thousandth parts of sulphate of lime (natural plaster is the best); all the coagulable matters unite in a firm head; the clear juice separated from this, is then stirred with peroxide of iron. After the separation of the oxide, nothing remains to be done but to evaporate the water; that is to boil down.

The hydrated peroxide of iron must be in the state of a firm paste. A litre (quart) weighs about 1145 grammes (2½ lbs.); it contains from 70 to 80 per cent. of water. The quantity to be employed varies with the juice; it is never more than 8 or 10 per cent of the juice, which amounts to 2 per cent. about of the solid matter, the rest being water. After its action on the syrup it takes a black color, shrinks and separates easily from the liquid. After it has been used, it is only necessary to wash it with warm water, after having left it exposed to the air, in order to give the organic matter which it has absorbed time to be destroyed, so that the deoxidized portion may take again the oxygen which it has lost. It may be used, as is seen, over and over again indefinitely, and requires but little expense for its regeneration. This fortunate property renders the question of the quantity to be employed of but little importance.

I will add in conclusion, that even now, its price is much below that of animal charcoal, for it may be supplied at 5 or 6 f. per 100 kilog. (\$8 to \$12 per ton), and this price will doubtless be much reduced hereafter.—*Journ. Frank. Inst., March, 1861, from Cosmos.*

(Continued from page 376.)

lead, because in a free state it is insoluble in water. We return now to the fourteen fluids.

It is self-evident that we have not to deal with the solutions of fourteen peculiar bodies. Several bodies may be contained only in one, or at the most two of these solutions, but another constituent may exist in six or eight of the fluids, and each contaminated with one or more constituents, and perhaps in one of these fluids quite pure. It is only by a number of reagents that the truth can be learnt. It is clear that the same reagent must be always applied to all portions of the fluids. For example, we add a few drops of a solution of perchloride of iron to a little of each of the fourteen fluids which have been taken for this purpose. In several of the portions there results an intense, in some portions a less intense, in other portions no coloration, or there results in some of these fourteen fluids a different coloration by this reagent to that of the remainder. In the same manner we add a second reagent to portions of these fourteen fluids, and so forth. By these means it may be ascertained how many different constituents are contained in the fourteen fluids. It may further be discovered by what means each of the constituents present can be separated from the remainder. The examination can only be conducted further by the aid of elementary analysis. By elementary analysis alone can the identity of a discovered body, separated from its accompanying constituents, be proved and established with a known body. The similarity of many reactions is so great with many bodies, that we should regard those as identical which elementary analysis shows us are very different bodies: for example, two members of a series of homologous substances which stand next to one another in the series, &c. On the contrary, bodies often appear different in many of their properties from a known body, while we by elementary analysis are taught that a complete identity exists, and the difference in many properties is due to impurities which are present in such small quantities, that they have exercised no noticeable influence on the result of the analysis.

#### § 6.—*Quantitative estimation of the constituents.*

For the completion of a work on the analysis of vegetable substances, it is appropriate to describe the methods which are employed to determine the quantities of individual constituents which have been found in a plant or in a part of a plant. It is often of importance in pharmaceutical or technical relations to know correctly the quantity of one or more constituents of a vegetable substance, or more rarely those of a whole plant. Instruction for the complete *quantitative* analysis of a vegetable substance cannot be given at the present time, as scarcely a complete *qualitative* analysis of any one plant, or part of a plant, exists. It is self-evident that it is impossible to describe methods for the separation of bodies which are unknown, whose proportions of solubility are quite as unknown as their com-

binations, and of whose existence we know nothing. With vegetable substances also which contain only known bodies, a method for their quantitative determination cannot be supplied, because the bodies most known are still too little investigated with exactness to afford grounds for the construction of a method of separation from a knowledge of their properties, and the properties of their compounds. Another circumstance renders a quantitative estimation almost impossible, even when we know the means of separating the constituents from one another: namely, a complete exhaustion of a vegetable substance under examination is almost impracticable, because it is not possible to comminute a substance in such a way that each cell is broken and its contents exposed to the action of a fluid. There also always remains behind a quantity—sometimes greater, sometimes smaller—of the constituent to be estimated in the material under examination. It may be easily determined by an experiment how much quinine can be *extracted* from a sample of cinchona bark, while the difficulties of the experiment would be considerably increased to determine how much quinine is *contained* in such sample of bark, as a little quinine always remains in the bark. I believe that it is quite useless to give the methods here which have been devised to determine quantitatively one or the other constituent in a certain vegetable substance; for example, the starch in seeds or bulbs, the sugar of beetroot, the quinine in cinchona bark, &c. To conduct a quantitative analysis, a complete qualitative analysis must first be undertaken, and the individual constituents must be accurately studied, and not only must their relations to solubility and their combinations be known, but their decomposition products, the properties of the same, and the quantity in which they appear, &c., must have been correctly studied. In a particular case, a method for the quantitative analysis of an individual part of a certain plant may be devised when the troublesome and tedious labor above mentioned has been performed in that particular case. But it is not impossible to supply a general method for this purpose, because a single body previously unknown, when present with other well-known constituents, must always cause an alteration in the entire order of the analysis. The majority of quantitative analyses, of which we have no deficiency, are regarded as useless. They can only claim to be considered as qualitative analyses. Independently of pharmaceutical or technical bearings, which in particular instances may render desirable an approximately correct quantitative determination of one or the other constituent of a certain material, an exact quantitative analysis can only have for its object the construction of a true representation of the normal constitution of the parts of a plant. But this object has never been accomplished by an analysis, however correct. We are far from being in a position, from a dismembered analysis of an ash, to draw a valid conclusion on the normal soil constituents of a plant, and quite as far from being able, from the individual analyses which have been per-

formed with especial reference to its organic constituents, to form a conclusion on the normal composition of a plant or one of its parts. In such analyses, whether we find ten or thirty per cent. of sugar, is of no importance. We only learn by this estimation that ten or thirty per cent. of sugar are contained in a certain part of a certain plant under certain circumstances, but we do not learn whether this quantity of sugar remains constant under all conditions, or whether the quantity found is the maximum or minimum quantity of sugar, or whether it lies between both extremes. That which has been stated with regard to sugar is applicable to every other constituent. Whether with the increase of one constituent the quantities of a second and a third increase or diminish, this and the like are questions which remain unanswered. Quantitative analyses will only then afford us information—that is to say, will be able to teach us the normal constitution of a vegetable substance—when they have been performed, in greater number, with materials which have been collected from plants at certain epochs of their development, and from plants which, under various climatic relations, have been developed in various positions, and from plants whose age we know correctly, &c.

These investigations, which are necessary to afford information on the normal constitution of a single vegetable structure, would claim the industry of a chemist for years. Consequently, there is little prospect existing that we shall be in possession of the results of such investigations in our time.

On the grounds just explained, we have also no rule for judging of the correctness or incorrectness of the results of quantitative analyses, when several of them have been performed on one and the same material by several chemists, and when the quantities of the different constituents in the various analyses differ considerably. Individual exact quantitative analyses, consequently, in proportion to the time and labor bestowed upon them, are of such little service, that it is advisable to neglect them. Under some circumstances the quantitative estimation of a constituent in a material may appear constantly necessary, to determine accordingly its value as a medicine or an article of commerce. Estimations of that kind of constituent, with the neglect of all others, possess proportionately little difficulty, and the corresponding method may be easily devised when a good qualitative analysis lies before us.

With regard to these quantitative estimations of individual constituents, attention may here be directed to circumstances of particular importance. The knowledge of the constituents of a material to be examined teaches us frequently that it is quite impossible to separate two constituents from one another in such a manner that one of them can be obtained pure without any loss. In such cases, or also when the separation can only be accomplished by tedious operations, the possibility of the *indirect estimation of a constituent* deserves our attention. This method for the estimation

of a constituent is by no means new. For a long time we have known how to estimate the contents of sugar from the quantity of alcohol which is obtained by the fermentation of the sugar. We have had processes for the estimation of starch from the quantity of sugar which can be produced from starch by various agents. Indirect estimations of this kind are often very easily performed in cases where a direct determination is endlessly difficult, or quite impossible. To estimate the quantity of caincio acid in the roots of *Chiococca racemosa* belongs to the impossible; the caffeo-tannic acid cannot be so exactly separated from the caincio acid, that the latter is obtained pure without loss. The caffeo-tannic acid mixed in its watery solution with hydrochloric acid and heated, does not give an insoluble or difficultly soluble decomposition product, but simply caincio acid. When a mixture of both substances is treated in the heat with dilute hydrochloric acid, the decomposition product of caincio acid is easily obtained, and its quantity can be estimated. This product is very difficultly soluble, but not insoluble, in the fluid from which it has separated. We know, by the examination which has been made, how much per cent. of the difficultly-soluble decomposition product is afforded by the pure caincio acid, and we know the solubility of this decomposition product as well as the quantity of fluid, consequently know the quantity of the decomposition product which remains dissolved therein; and thus we can estimate, in a short time, the quantity of caincio acid with the greatest facility and exactness. Indirect determinations of that kind may be performed, in a number of cases, without any difficulty and in a very short time. The correction first employed by Fresenius in mineral analysis for the solubility of difficultly soluble precipitates must not be passed over here without attention being drawn to it.

#### MICROSCOPIC EXAMINATION WITH THE AID OF REAGENTS.

Repeatedly the assertion has been made, that a chemical analysis can only be considered as completed when it not only enables us to learn the constituents of a vegetable substance, but, with the assistance of the microscope, renders us so experienced that we know in which form, and at what place, to find the individual constituents in the material under examination, and make out whether they are in the form of crystals or in the form of amorphous masses, or exist in a dissolved form in the contents of the cells, or as a constituent of the walls of the cell; also the density of its layers, and so forth. It is certain that we can only then say we know a plant or its parts when our investigations in chemical and anatomical directions are equally complete, and at the same time consolidated to a whole. But the assertion quoted is decidedly untrue from a chemical point of view, if correct from a botanical or a vegeto-physiological one. The chemical investigation has only to teach us the problem what constituents a plant contains, and in what quantities which naturally fluctuate between two certain extremes.



Whatever relates to the place in which a constituent exists is certainly not a chemical question, even when it lies in the nature of things that with chemical assistance, or perhaps alone, or at least more easily and certainly than without such assistance, this question can be answered.

In physiology, in geology, and other sciences, there is an abundance of problems which only those are in a position to solve who possess a certain sum of chemical knowledge. On this account, these problems are merely physiological or geological ones, and the physiology or geology is, on this account, no chemistry, although when not studied with chemical knowledge, they are less essentially advanced. When the chemist takes the arithmetical mean of the results of three elementary analyses, he is not necessarily an arithmetician, although he must have learnt to calculate to perform this operation; and when a chemist arrives at the remarkable idea of calculating the mean of his analysis according to the method of the smallest quadrate, nevertheless he is not a mathematician. The mineralogist is not a chemist when he tests a mineral with the blowpipe.

To return to the microscopic examination with the aid of reagents. It will be self-evident that it can only be undertaken when a correct qualitative analysis has already been performed with the material under examination, and the behaviour of the individual constituents with reagents has to be inquired into with exactness. It is also self-evident that we cannot conduct an examination of that kind with five or six reagents, as some persons still appear to consider at the present day. We must have confidence in the idea that we must test under the microscope in the same manner as without it. No one believes that simpler methods are employed in such chemical analysis, and that several reagents can be used when spectacles are worn. But a microscope is nothing else than spectacles which permit us to observe things which we are not able to see with our naked eyes on account of their smallness; it saves us chemical operations and chemical reagents quite as little as the spectacles of a short-sighted or long-sighted chemist are in a position to spare him such things. What we see under the microscope with the aid of reagents is only understood when we have been able, by a previous analysis, to know with precision the constituents. Whoever endeavors to learn anything under the microscope with the aid of reagents without a previous analysis and without a preliminary study of the constituents, is like a man who strives to read a book which is written in a language unknown to him, and therefore unintelligible to him with the assistance of lens. The result is precisely the same. He will know as little after the labor has been done as he did before the commencement. The vegetable anatomist is quite right when he endeavors to accomplish his object by the application of some few reagents, and facilitates and renders possible his observations, because by a few chemical agents he makes certain outlines appear more defined, or compels

some bodies to disappear, which prevent such observations. In chemical relations merely, nothing results from these observations, as bodies are present which behave towards certain reagents precisely as many hundred other bodies, some of which we know accurately, others very little or not at all. Of bodies which are colored brown by iodine, and such as are colored red by sulphuric acid with the addition of sugar, there is an innumerable quantity. From such reactions on certain bodies, to establish certain classes of bodies, is folly.

To give a method for the microscopic examination of vegetable substances whose composition has been previously ascertained with exactness, and whose constituents have been accurately investigated with regard to their behaviour to the various reagents, is at the present time an impossibility. We have a mass of difficulties therein to overcome, and the result of an investigation is frequently a doubtful when even a probable one, as we may have often and cautiously made observations, at least with regard to one or more constituents, when there was also frequently no difficulty in procuring certainty concerning other constituents.

#### § 8.—*Conclusion.*

So far as was practicable in the present position of our knowledge, I believe that I have supplied a method for the examination of plants or their parts which does not easily permit a body to be overlooked which exists therein as a constituent. I believe, also, that by following the method given with some attention, suitable methods of separation can be easily devised to procure as many of the individual constituents as are necessary for the performance of a more minute examination of them, which will afford us again useful hints for devising improved methods of separation. When a minute examination of a constituent is intended, and consequently a sufficient quantity is to be prepared for this purpose, it is an unnecessary labor and a useless loss of time, when the order of analysis here described is pursued, to separate and prepare all the bodies which are contemporaneously present. We often attain this object very quickly when a certain quantity of the material is employed for the preparation of a constituent, and in this undertaking we have only a regard to this one constituent, and are disposed to sacrifice the remaining ones. This shorter and simpler method for the preparation of individual constituents can only be devised from the experiences which we have made by a systematic analysis, which has enabled us to learn all the constituents present, and given us the means to prepare smaller quantities of the individual constituent for the examination of its behaviour with other bodies, as far as it is necessary, to discover methods of preparation based on these experiences, which will enable us to procure larger quantities of the constituent for further investigation in the shortest possible time and with the least expense. When we have prepared sufficient quantities of all the constituents

in an approximately pure condition, the next problem is to completely purify these bodies. This completely pure preparation of bodies is attended often with no difficulty, as, for example, is the case with easily crystallizable bodies or with volatile bodies when they exist with non-volatile bodies, or even with volatile ones if in reference to their chemical characteristics they are widely different. Generally, bodies of the opposite character of an acid and a base are easily obtained pure when they are at the same time present with indifferent substances; likewise all bodies which are not *per se* crystallizable when they are capable of forming compounds, which can be readily obtained in a crystalline state. On the contrary, it is extremely difficult to completely separate indifferent amorphous substances when they exist mixed with one another, and to prepare in a state of purity the individual constituents of such mixtures. But the pure preparation is often not the greatest difficulty, but the establishment of the proof that the substance has been prepared in a state of purity. It is often possible to effect the pure preparation of a substance, but we have no index of the purity of the prepared substance. This is often the case with the amorphous and indifferent constituents of vegetables. There is frequently no other means for obtaining certainty with regard to the purity of a substance than by elementary analysis, conducted with portions of the substances which have been prepared in different ways from the same part of the plant, or where possibly taken from different parts of the plant. The complete agreement in the results of the analysis of the different portions of the same substance affords a proof of its purity. The individual constituents which we have prepared in a pure isolated condition are submitted to a further chemical examination. The elementary analysis of these substances combined with their reactions, will supply us with an evidence whether the constituent found is or is not identical with a body already known. A close examination, to the execution of which the previous analysis will afford assistance, will now teach us the constitution of the individual constituents. From this knowledge an insight is obtained into the connection between the individual constituents, that is to say, our investigation will afford results quite as useful for vegetable physiology as for chemistry itself. We secure an important advantage by these investigations, when we make the objects of our studies not only the various individual parts of a plant, but also the various individual parts in different epochs of their development. Observations on the formation of a body from one or several others will bring, most easily, light into the darkness in which the transformation of vegetable bodies is wrapped up. Correct analyses of plants, or rather of their parts, in their various relations, and their gradual development consequently, are a means to enlarge in a very productive manner, not only our chemical, but also our physiological knowledge. In the hope of having, by the present work on the analysis of plants and their parts, contributed something towards the accomplishment

of these aims, I submit these pages to the considerate judgment of the experienced chemist, and to the zealous student in this field of inquiry, who has had no opportunity from his own experience to devise a method for the analysis of vegetable substances. (See page 492.)

### TENTH ANNUAL MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

The meeting of this body, which was to have taken place at St. Louis, in 1861, but postponed account of on the national troubles, commenced its sessions at the Hall of the College of Pharmacy, Filbert street above Seventh, on Wednesday, August 27th, 1862, at 8 o'clock P. M.

The President, Henry T. Kiersted, of New York, called the meeting to order. James T. Shinn, of Philadelphia, Secretary.

Samuel M. Colcord, of Boston, P. W. Bedford, of New York, and A. B. Taylor, of Philadelphia, were appointed a Committee on Credentials, pending whose action the members were invited to enroll their names on the register.

The Committee on Credentials reported the following delegates from Colleges of Pharmacy, viz :—

*From the Massachusetts College of Pharmacy.*—S. M. Colcord, Henry W. Lincoln, Charles T. Carney, Thomas Hollis, and A. P. Melzar.

*From the New York College of Pharmacy.*—John Milhan, John Meakim, John W. Shedden, P. W. Bedford, Wm. Wright, Jr.

*From the Maryland College of Pharmacy.*—J. J. Thomsen, N. Hynson Jennings, J. Faris Moore, Jonas Winter, and J. Brown Baxley.

*From the Philadelphia College of Pharmacy.*—Samuel F. Troth, Daniel B. Smith, Elias Durand, Edward Parrish, and James T. Shinn.

The Executive Committee then reported a list of members elected in the interim, viz :—

Charles C. Thornton, Sharon, Miss.	Theobald Frohwein, New York City.
Fairman S. Taber, Huntsville, Ala.	R. S. McMurdy, Albany, N. Y.
Edward R. Fell, Philadelphia, Pa.	Thomas S. Maffitt, Boston, Mass.
Frederick A. Keffer, " "	Laban Beal, " "
A. S. White, Mount Holly, N. J.	Nathan F. Peck, Willimantic, Conn.
Francis M. Basset, Brooklyn, N. Y.	J. R. Carpenter, Calais, Maine.
John A. Niebrugge, " "	George J. Waugh, Hamilton, C. W.
S. F. Conway, " "	Robert J. Brown, Leavenworth,
George Peduzzi, New York City,	Kansas.
Bernhard Reinhold, " "	Andrew J. Tully, Cincinnati, Ohio.
Adolph G. Dunn, " "	John C. Gerhard, " "
James S. Higgins, New York City,	

The Roll was then called, and the names of those present noted by the Secretary.

The following named gentlemen were brought forward by the Executive Committee as Candidates for membership, viz :—

Wm. J. Allinson, Burlington, N. J.	David Howath, Andover, Mass.
W. Fisher, New York City.	Benj Gilpatrick, Jr., Boston, Mass.
A. W. Gabaudan, New York City.	Wm. H. Squire, Germantown, Pa.
William H. Macrea, Factoryville, Staten Island, N. Y.	Frederick Rollman, Philada., Pa.
Henry W. Lesley, Bristol, Pa.	Ferris Bringham, Wilmington, Del.

They were duly elected by ballot, Mr. Wright, of New York, and Mr. Parrish, of Philadelphia, acting as tellers.

The Report of the Executive Committee being called for, it was read by the Chairman, W. Procter, Jr., and laid on the table for future consideration.

The Report of the Committee on the Progress of Pharmacy being called for, the Chairman, J. M. Maisch, presented a voluminous report, which, after a few remarks, was laid on the table for future disposition.

Invitations from the Academy of Natural Sciences, and from Surgeon Thomas, of the United States Army Department of the Episcopal Hospital, to visit those Institutions, were received, and read by the Secretary, who was directed to return the thanks of the Association.

Reports of Special Committees being in order, that on "Adulterations" was called for. Wm. Procter, Jr., stated that the Chairman, Charles T. Carney, of Boston, had been ill for many months, and wholly unable to accomplish the Report; that two other members of the Committee had died since the last meeting, and the remaining members were unaware of Mr. Carney's illness until too late to prepare a Report.

Samuel M. Colcord, Chairman of the Committee on the sale of Poisons, stated that no report had been prepared, owing to the postponement of the meeting last year, and the uncertainty of there being one this, until May last, since which time his business engagements and domestic affliction have prevented it.

The object of the appointment of the Committee to promote the attendance of members at St. Louis, being defeated by the failure of that meeting in 1861, said Committee had no report to make.

It being now in order to appoint a Committee for the nomination of Officers to serve during the ensuing year, the delegations present selected the following gentlemen in accordance with a constitutional provision.

Samuel M. Colcord, of the Massachusetts College of Pharmacy.

P. W. Bedford, " New York " "

Edward Parrish, " Philadelphia " "

J. Jacob Thomsen, " Maryland " "

To whom the President added :

Ferdinand F. Mayer, of New York.

Ferris Bringham, " Wilmington, Delaware.

J. Faris Moore, " Baltimore.

After some discussion on the propriety of holding an Evening Session, which was not agreed to, the President read his interesting and suggestive Annual Report.

[This paper first dwells upon the state of the country, then refers to the reports of the Treasurer, Executive Committee, Committee on Adulterations, Committee on sale of Poisons, Committee on Deferred Business, special subjects referred to individuals for investigation, life membership and the suspended list; the report concluding with some feeling allusions to the national difficulties. Our space will not admit of a fuller notice.]

On motion, the Address was referred to the Executive Committee for publication. The meeting then adjourned until 9 o'clock to-morrow morning.

*Second Session—Thursday morning, Aug. 28th, 1862.*

The Association was called to order, near the hour adjourned to, by the President, and the minutes of the last meeting were read and adopted.

On motion of Edward Parrish, the Secretary was directed to engross in the Minutes extracts of letters from absent members to the Chairman of the Executive Committee, giving reasons for their non-attendance.

The Executive Committee reported the name of Edwin R. Smith, of Monmouth, Illinois, as a candidate for membership. A ballot being ordered, the tellers reported his unanimous election.

The Committee on Nominations reported the following names for officers and standing committees during the ensuing year,—viz.:

*For President*—WILLIAM PROCTER, JR., of Philadelphia.

*For Vice-Presidents*—JOHN MILHAU, of New York; EUGENE L. MASSET, of Missouri; J. FARIS MOORE, of Maryland.

*Treasurer*—HENRY HAVILAND, of New York.

*Recording Secretary*—P. W. BEDFORD, of New York.

*Corresponding Secretary*—JOHN M. MAISCH, of Brooklyn, N. Y.

*Executive Committee*—EDWARD PARRISH, Chairman, Philadelphia; HENRY F. FISH, Waterbury, Connecticut; WM. J. M. GORDON, Cincinnati, Ohio; SAMUEL M. COLCORD, Boston, Mass.; P. W. BEDFORD, Secy. ex-offic., New York City.

*Committee on the Progress of Pharmacy*—FERDINAND F. MAYER, New York City; W. NEERGAARD, New York City; J. JACOB THOMSEN, Baltimore, Md.; E. W. SACKRIDER, Cleveland, Ohio; J. M. MAISCH, Cor. Sec. ex-offic.

On motion a ballot was ordered for President and Vice-Presidents, when the tellers reported their unanimous election.

On motion of Dr. Squibb, the President was requested to deposit a ballot for the remaining officers and committees; the tellers reported that they were unanimous elected.

Mr. Kiersted now requested Mr. Procter, the President elect, to take the chair, in doing which the latter made the following brief remarks :

*" Gentlemen of the Association :*

" I believe that your partiality and personal good feeling has removed me from a sphere wherein I could operate usefully to the Association, and creditably to myself, to a position for many of the duties of which I am unqualified by ignorance of parliamentary usage. This much I earnestly represented to a portion of the Nominating Committee. In accepting, therefore, this chair, I will endeavor to perform its duties, and I beg you to remember what has been said, and be as charitable towards my short-comings as you have been liberal of your good will."

The Secretary then resigned his place to Mr. Bedford, the Secretary elect.

On motion of the Chairman of the Business Committee, the Report of the Executive Committee was brought up ; when the Chairman of that Committee requested to amend the Report by inserting a paragraph which had been omitted in copying, relating to the plan of admitting new members in the interim between meetings, as directed in the Constitution. The request was granted. It was then moved that the Report of the Executive Committee be accepted and recorded in the minutes.

[This Report gives an account of the publication of the Proceedings of 1860, of their distribution, and of their cost. The aggregate expense of printing, engraving, paper, and binding 1000 copies is stated at \$602.76. The expenses of distribution \$51.35. The number of new members admitted in the interim was twenty-two, and seven deaths have occurred.]

The recommendation in the report regarding the mode of creating members in the interim, was now discussed. Dr. Squibb said that the present plan involved much labor, and thought the time had come when it would be proper to abolish the plan of admitting members in the interim. Mr. Parrish thought a better plan might be adopted, and suggested that a committee be appointed to consider this subject, and also the future disposition of the suspended list recommended in the President's annual address.

On motion, the Chair appointed Samuel M. Colcord, Edward Parrish, and J. J. Thomsen, to this duty.

The Treasurer's report now being in order, it was read by that officer, and on motion of Mr. Kiersted, was referred by the Chair to an auditing committee, consisting of Alfred B. Taylor and William Wright, Jr.

On motion of the Business Committee, the recommendation of the Treasurer in regard to the suspended list of members in arrears, was referred to the committee appointed to consider the subject of the admission of members, &c.

The report on the Progress of Pharmacy being called up, the Chairman, Mr. Maisch, proceeded to read such portions of it as would give the Asso-

ciation an idea of its contents and arrangement, which occupied a considerable time.

Mr. Parrish remarked in reference to the zeal and perseverance of Mr. Maisch, and moved that the report be accepted, and referred to the Executive Committee to be published in full, and that the thanks of the Association be presented to Mr. Maisch.

[This Report occupies 120 pages of manuscript, and differs from the previous Reports in having the subjects classified,—the *materia medica* under natural orders—the Pharmacy under the general heads of preparations, as powders, pills, mixtures, etc.—and from the portion read by the Chairman we infer not only that it is a valuable compend from the Journals, but that it has cost a great amount of labor and perseverance to complete it. It will be seen further on that the Association have manifested their approval of this Report by an honorary award of 50 dollars to the Chairman.]

The Executive Committee proposed for membership Daniel C. Robbins, of New York, and John C. Savery, of Philadelphia.

A ballot being ordered, the tellers reported them to be duly elected.

Mr. Maisch stated that Prof. Wiggers, of Gottingen, had sent to the Association "Canstatt's Jahresbericht," or Annual Report on the Progress of Pharmacy and collateral sciences in all countries, for the year 1860, in exchange for the volume of this Association, and remarked that the book contained little information of American Pharmacy, our Pharmaceutical Journals being but little known in Europe, except through the English Journals, which but rarely extract from them.

The Committee on auditing the Treasurer's Account reported that they had examined the account and found it correct, whereupon the report of that officer was adopted, and directed to be published in the Proceedings.

[The Treasurer reported a balance of cash in hand, after paying all expenses of publication, etc., for the last meeting, of \$675.]

Mr. Parrish, after apologizing for so frequently speaking, desired to know when probably this session would adjourn, as it would be a suitable time to visit the Academy of Natural Sciences between the sessions. He also referred to an excursion up the Delaware, which it was proposed to carry out to-morrow afternoon, should the convention adjourn in time. He then moved that when this session adjourns, it shall be at 12½ o'clock P. M., which after some discussion was agreed to.

The Chairman of the Business Committee brought up the matter of advancing the amount of the annual contribution, and moved that the subject be postponed until next year. Mr. Taylor stated that many of the members would soon be exempt as life members, and he desired to see that clause of the constitution altered, to prevent a failure in the funds of the Association.

No action was taken upon either of these propositions.



The Business Committee brought forward the following resolution which was passed :

*Resolved*, That the Chairman of the Executive Committee be authorized to employ a phonographic reporter and clerical assistance when necessary to carry out the details of publication for the Association ; and that the Treasurer be authorized to pay the bills accruing therefrom.

The session then adjourned.

*Third Session:—Thursday Afternoon.*

The meeting was called to order by the President near the time adjourned to, when the Secretary read the minutes of the morning session, which were corrected and adopted.

Dr. Squibb of the Business Committee, brought forward a resolution to discontinue the Committee on Adulterations.

Mr. Colcord hoped the Committee would be continued.

Mr. Wright, of New York, thought the adulteration of medicines was sufficiently extensive to warrant such a Committee.

Mr. Mayer referred to Article 4th, Section 3d, of the Constitution, wherein the duties of the Committee on the Progress of Pharmacy are stated, and asked whether that Committee would not be sufficient to carry out the duties of the Committee on Adulterations.

Mr. Kiersted suggested that the title of the Committee should not be changed, as it was quite appropriate.

Mr. Parrish offered the following amendment to the resolution of Dr. Squibb :

*Resolved*, That the Committee on Adulterations be discontinued, and a Committee of five be appointed, to be called " The Committee on the Drug Market," whose duty it shall be to report annually the fluctuations in the supply and demand of drugs, the variations in quality, and adulterations and sophistications coming under their observation, or reported to them by others ; and that they be authorized to make report on any adulterations and sophistications of immediate interest, through the pharmaceutical journals as soon as practicable after its discovery ; and that all members are requested to furnish information of the kind required, to the Committee, without unnecessary delay.

Mr. Taylor stated his wish that the amendment would prevail, as it would be far more interesting. The Committee on Adulterations had never accomplished the intention of their organization.

Mr. Milhan stated that since the value of drugs had been so much enhanced, there was more sophistication than ever, and gave instances showing the need of being on our guard to detect them. He hoped that a Committee would be authorized, and that they be requested to report from time to time in the Journals of Pharmacy.

Dr. Squibb here withdrew his motion, when the Chair stated that the subject before the meeting was the resolution of Mr. Parrish.

Mr. Wright moved that the title of the committee, be the " Committee on Adulterations and the Drug market."

Mr. Wiegand thought the title sufficiently comprehensive to take in all that was necessary; that it was not needful to include articles out of our sphere of action. The motion of Mr. Wright having failed, the resolution of Mr. Parrish was finally brought up and after some little discussion passed unanimously.

Dr. Squibb here stated that the Business Committee (consisting of himself, Mr. Procter and Mr. Carney,) was not a standing committee, but organized last meeting on motion of Mr. Meakim to facilitate business at that time, and was directed to hold over till this meeting, to bring up unfinished business, and if thought advisable it would be better to appoint a new committee.

The question being taken on this suggestion, it was agreed to, when the President appointed the following gentlemen as the Business Committee for the ensuing year, viz: Dr. Edward R. Squibb, of Brooklyn, N. Y., S. M. Colcord, of Boston, and John J. Thomsen, of Baltimore.

The Chairman of the Business Committee now brought forward the matter of the general Index to the first eight volumes of the Proceedings, which Mr. T. S. Wiegand, of Philadelphia, was by resolution requested to prepare, and which had required much labor to complete. On motion the paper was accepted, and the thanks of the Association given to Mr. Wiegand for this laborious service.

Mr. Taylor suggested that it should be bound separately, and not incorporated with the volume of Proceedings, as it was no part of that.

Mr. Parrish moved that a committee of two be appointed to examine the Index prepared by Mr. Wiegand, and report at a future sitting, which was agreed to, and Messrs. A. B. Taylor and J. Faris Moore were appointed by the Chair for that duty.

The Business Committee then suggested that the Scientific Queries be now proceeded with, which was carried.

To accommodate Mr. Wiegand, who desired to leave, query No. 35, relative to Medicinal Spirits, was first called up, to which he read a reply, which was accepted and referred to the Executive Committee. To query No. 37, "on Commerce in Quackery," Mr. Wiegand stated that he had not been able to prepare a reply.

Query No. 1. Relative to Morphia and Opium Smoking. Mr. Procter verbally stated that he had experimentally commenced the subject as regarded the volatility of morphia, but that in regard to the precise conditions of heat in which opium is placed in the process of opium smoking he had been met by difficulties that had discouraged him from proceeding further, and that he had therefore abandoned the subject.

Query 2. Relative to Japanese wax—accepted by Thomas A. Lancaster, of Philadelphia, received no reply.

Query 3. On Oil of Benne (Ol. Sesami,) as a substitute for olive oil in pharmacy, was replied to by James T. Shinn, of Philadelphia.

Query 4. On the production of Tartar in the wine region of the Ohio valley, being called for, the President read a paper from Mr. W. J. M. Gordon, of Cincinnati, to whom it was referred, enclosing a letter from Mr. Graham, President of the Wine Grower's Association of the Ohio valley—both of which were referred for publication.

Mr. Maisch thought we should encourage the wine growers and dealers to save the tartar deposits. The dependence of this on foreign countries could be in time in great measure relieved if we take some action. We should address the Association, stating how important it was to them to save the tartar as a source of profit with but little trouble. Mr. Maisch was invited to produce the draft of a resolution and submit it at a future sitting.

Query 5. Relative to American Aconite root was not replied to by Mr. Tilden, of New Lebanon.

Query 6. On Arsenical Pigments, accepted by B. J. Crew, received no reply.

Query 7. Relative to a permanent solvent for Cantharidin, accepted by Wm. R. Warner, was not answered.

Query 8. On Garancin—directed to B. J. Crew, was not replied to.

Query 9. Relative to Chenopodium, received no written reply, but Mr. Moore stated that Mr. Balmer, who had accepted the question, had engaged in its investigation, but was not yet prepared to report, and requested its continuance to him, which was agreed to.

Query 10. Relative to the nature of the active principle of Capsicum, was not replied to by Mr. F. L. John, its acceptor.

Query 11. Relative to Conium seeds, referred to Mr. Fish, received no reply.

Query 12. Relative to the resinoid of Colocynth, accepted by John Faber, of N. Y., received no reply at the meeting, but subsequently a written paper (with specimens) was received by the President from Mr. Faber, and will be incorporated in the Proceedings on the authority of a resolution adopted later in the sessions.

Query 13. Relative to the Oil Wells of Pennsylvania, etc., accepted by G. W. Weyman, of Pittsburgh, being called up, Mr. Procter informed the meeting that the acceptor had investigated the subject, and had visited the oil region for that purpose, and was nearly ready to report, when the loss of his assistant, who had enlisted, prevented its completion and his appearance at the meeting, and therefore requested a continuance of the subject. Mr. Procter wished the paper to be published in the Proceedings if finished in time.

Dr. Squibb and Mr. Mayer objected.

Mr. Parrish advocated the suggestion.

Dr. Squibb, urged that previous action of the Association had required all papers for the Proceedings to be completed before presentation. Perhaps this was a special case. The object was to have perfect reports so

as not to delay the publication of the Proceedings. He therefore moved that the question be continued to Mr. Weyman for another year—which was agreed to.

Query 14. Was postponed for the present, Mr. Bullock being absent.

Query 15. The President read a reply to this query on cotton seed oil, from William J. Watson, of Brooklyn, N. Y., accompanied by two specimens of the oil.

Query 16. Regarding the therapeutic properties of Propylamin, accepted by Dr. Donnelly, was not replied to.

Query 17. Relative to a test for the genuineness of extract of *Cannabis Indica*, accepted by Mr. Procter, was not replied to, but the acceptor stated that his experiments were yet incomplete, and desired that he might have his results incorporated in the Proceedings if completed in time.

Mr. Allinson offered the following resolution, which was passed.

*Resolved*, That the Executive Committee be authorized to insert in Volume X. of the Proceedings, such essays in answer to queries as may be completed in season, and as may in their estimation possess sufficient present importance to render it desirable.

Query 18. Relative to Honey, referred to F. L. John, was not replied to.

Query 19. As to the best manner of dispensing phosphorus, was replied to by Mr. Faber in a paper received too late for the meeting.

Query 20. On the *Veratrum Viride*, was replied to by George J. Scat-tergood in a paper which elicited much commendation from Mr. Parrish and others, and several queries were put to the writer in regard to the chief points of his paper,—viz. : the fact that the sedative power of *Veratrum viride* is owing more to a resinoid matter accompanying *veratria* than to the *veratria* itself.

Query 21. On *Copaiba*, referred to Prof. Carson, received no reply.

Query 22. On the Cod-Liver Oil trade was not answered by Mr. Blatchford, of Rockport, Mass., to whom it was referred.

Query 23. Relative to Sugar-Coating Pills, etc., accepted by Mr. Stearns of Detroit, received no reply.

Query 24. Relative to *Convolvulus panduratus*, was continued to Mr. Lemberger, of Lebanon, Pa., at his request.

Query 25. Relative to *Celandine*, was continued to Mr. Bedford.

Query 26. On the tannin-value of our indigenous astringents was not replied to by W. B. Warner, its acceptor.

Query 27. Mr. Mayer was ready to answer this query, but wanted it postponed till to-morrow morning, on account of the light.

Query 28. On the statistics of the trade in Castor Oil being called up, Mr. Mayer stated that he had been promised full statistics by a person in the business, who had failed to produce them. A large quantity of this oil is made in Jersey City, but those engaged in it are not disposed

to give information. The seed is imported free of duty, the best being used for oil, and the refuse, with the cake from the press, for manure.

Query 29. Relative to the acrid principle of Castor Beans, was not replied to by Mr. Warner.

Query 30. What is the true botanical source of Southern Prickly Ash bark? Prof. Thomas, to whom this question was referred, sent no reply.

Query 31. On the influence of new remedies on pharmaceutical progress, was replied to by Edward Parrish.

The Committee appointed to examine the Index gave a report, which was adopted.

The Reporters say the Index will probably occupy forty-five printed pages, and they recommend it to be printed and placed at the end of the volume of Proceedings for 1862, but that it be paged separately, so that those who desire it may have the Index bound separately.

The Business Committee suggested that a Committee be appointed to examine the specimens on exhibition and report at a future sitting, which was carried. And the Chair appointed J. Faris Moore, George J. Scattergood and Ferd. F. Mayer to that service.

Mr. Parrish moved that a Committee of five be appointed to propose queries for the ensuing year. It was suggested and agreed to that the President act as Chairman of this Committee, and that he appoint the remainder of the Committee.

A motion to adjourn now prevailed.

*Fourth Session—7½ o'clock P. M., Aug. 28th.*

The President called the meeting to order and the Secretary read the minutes of last session, which were adopted.

The President announced the following as the Committee to prepare subjects for investigation next year,—viz.: William Procter, Jr., John M. Maisch, Charles Bullock, J. Faris Moore and P. W. Bedford.

Query 32. On Anilin dyes, was not replied to by Mr. Weyman.

Query 33. On Tartaric acid and the tartrates. Mr. Maisch stated that he had devoted much time to this subject, and had made much progress with it, feeling interested in the researches, but that he had been so occupied in the preparation of the Report on the Progress of Pharmacy as to be totally unable to write out his results. He proceeded to give, verbally, a detailed account of them, and then asked that the query be continued to him till next year, which was agreed to.

Query 34. On the availability of the Tomato as a source of citric acid, was not replied to by Thomas A. Lancaster, of Phila.

Query 36. What course should be pursued by pharmacutists in relation to adulterated liquors. Henry F. Fish, of Waterbury, Conn., in a letter addressed to the President, made a partial report on the subject.

The letter was referred to the Executive Committee, and the subject was continued to Mr. Fish.

Query 38. On the leaves of the *Ricinus*, was not answered because of the death of the acceptor.

Query 39. On *Anacahuita* wood, not replied to by Mr. Caspari.

Query 40. On the present sources of *Senega* and *Spigelia*, was replied to at the last session by Mr. Dohme in an explanatory letter.

Query 41. On the production of *Elatarium* in the United States, was replied to by Prof. Thomas, and the paper referred for publication.

Query 42. On pharmaceutical apparatus, was answered by Edward Parrish.

Mr. Bullock being now present, an answer to Query 14 was called for. He stated verbally that it was almost impossible to find wood creasote of authentic character, it being generally impure carbolic acid. The Messrs. Dupont had informed him that they ceased to find it profitable to make wood creasote when it was below \$4 per pound; and also that their crude creasote was much more effective for burns than the present commercial article.

Dr. Squibb said he had used Merck's creasote for burns and deemed it excellent, which he felt sure was carbolic acid.

Mr. Bullock had had creasote, which was sold as wood creasote, that crystallized in winter.

Carbolic acid had been sent from London to the Surgeon's Department for use in the army as a disinfectant; and, when mixed with gypsum, as a disinfectant powder. But Grace Calvert says it is not a disinfectant, only antiseptic.

Mr. Parrish had had applications for odorless creasote from dentists, but could not get it, and wished to know if arsenious acid was soluble in that liquid. The dentists use such a mixture with morphia for destroying the dental nerves. Pure carbolic acid is not odorless.

Mr. Maisch thought Merck's creasote was from wood, as there is no coal region near him; but at his prices it could not be made from wood, and coal tar is easily transportable.

Query 44, to Mr. Shivers, received no reply.

Query 45. On *Arnica*, to Dr. Henry T. Cummings, was not replied to.

Query 46. On the American species of *Cantharis*, referred to T. Chapman Hill, was replied to in a paper read by the President.

Query 47. Dr. Squibb stated that he had no reply to this query relative to a pharmaceutical still, and wished to abandon the subject, yet he proposed in lieu to read a paper on a subject formerly given to him, relative to bleached morphia salts, which was read and referred for publication.

Mr. Wright stated that in a large hospital at New York, unbleached quinine was preferred, and Dr. Squibb had examined it and found it to contain more quinia than the white salt.

Dr. Squibb also read a volunteer paper on Scammony, which was accepted and referred for publication:

Query 48. On Arrowroot, was replied to by Evan T. Ellis.

Some general discussion ensued after reading this paper, on the subject of this fecula, in which St. Vincent Arrowroot was spoken of as equal in real value to the Bermuda variety, though of less commercial value.

Query 49, to Dr. Battey, elicited no reply.

Query 50. This query was read at the following session, it having been delayed by post.

Query 51, to Mr. Tilden, was not replied to.

Edward Parrish exhibited a small apparatus for testing the relative explosibility of different lots of coal oil to detect benzine.

The Chairman of the Business Committee brought forward a matter of delinquency of a Boston member, but action was postponed until to-morrow. It was moved and carried that when we adjourn it be till to-morrow morning at 9 o'clock.

The Business Committee brought up from the list of unfinished business the subject of an act of incorporation, and the committee appointed to report amendments to the drug law. It was moved and carried that the subjects be dismissed, and Committees be discharged from further service.

The Committee to report on a certificate of membership was indefinitely postponed.

The subject of offering prizes for valuable elaborate papers was then brought forward by the Business Committee from the last annual session, and after having been discussed, it was concluded that, at least for the present, the object of the Association could be attained by special resolution to meet the cases that might arise.

The following preambles and resolutions were then offered and unanimously carried:

*Whereas*, The Report on the Progress of Pharmacy having now necessarily embraced a period of two years, involved an unusual amount of labor; and whereas, the Chairman of that Committee has not only cheerfully given his talents, time and labor to the work, but has systemized and perfected the report to a degree which must reflect great credit upon the Association. Therefore

*Resolved*, That the Treasurer of the Association be directed to hand to the Chairman of the Committee on the Progress of Pharmacy, Mr. John M. Maisch, the sum of fifty dollars, as a prize offered by the Association in honorable recognition of his services in the report of this Committee; and that the thanks of the Association be and are hereby also given him.

*Resolved*, That a copy of this preamble and resolutions be given to Mr. Maisch by the Secretary.

*Whereas*, By resolution of the Association at its last annual meeting, it was decided to have a general Index of the Proceedings prepared up to the year 1860, and that a full set of the Proceedings were given to the member who should accomplish the work, as a complimentary prize for

the labor involved ; and whereas it has subsequently appeared that a full set of the Proceedings was not in possession of the Association ; therefore

*Resolved*, That in appreciation of the time and labor bestowed upon the general Index by Mr. Thomas S. Wiegand, the Treasurer be directed to procure a bound copy of Muspratt's Illustrated Cyclopædia of Chemistry, and present it to Mr. Wiegand, with the thanks of the Association, as a complimentary prize offered for the work accomplished by him.

*Resolved*, That a copy of this preamble and resolutions be sent to Mr. Wiegand by the Secretary.

On motion of Mr. Parrish, it was carried, that to-morrow, at 11½ o'clock A. M., be designated for considering the next place of meeting; when, on motion, the session adjourned.

*Third day—Fifth Session, August 9th, 1862.*

The meeting having been called to order by the President, on motion of A. B. Taylor, James T. Shinn was appointed Secretary *pro tem.*, during the absence of the Secretary.

On motion, a preamble and resolution were brought forward, read and discussed, relative to an individual, now a member, in Boston, who has prostituted the Certificate of the Association and the names of its officers to further the sale of his quack preparations, in violation of his written signature of agreement to uphold the objects of the Association, in article 1st, section 5th, of the Constitution.

After considerable discussion of the merits of the case, a vote on the resolution for expulsion was directed to be taken by ballot.

The Chair announced, on the ballot being rendered by the tellers, that it proved unanimous in favor of the resolutions, and the Secretary was directed to notify him of the action of the Association.

The Executive Committee reported the names of A. W. Newton, of Bristol, Bucks County, Pa., J. C. Hughes, of Pottsville, Pa., and George Y. Shoemaker of Philadelphia, as candidates for membership. They were balloted for and duly elected.

Mr. Maisch now presented the following preamble and resolutions, which were passed unanimously:

*Whereas*, It has come to the knowledge of the American Pharmaceutical Association, that the tartar produced from American wine, has hitherto been thrown away as valueless by the wine growers, therefore

*Resolved*, That we regard the production of tartar from American wine of great importance, on account of the extensive uses to which that product is applied in Pharmacy, domestic economy and the arts ; that we believe that crude tartar and purified (cream of) tartar will always meet with a ready sale ; and that the wine growers will advance their own interests and assist in developing the resources of American Agriculture by making the experiment of saving the tartar.



*Resolved*, That the Corresponding Secretary be directed to furnish a copy of this preamble and resolutions to the President of the Wine-growers' Association of the Ohio valley.

The Committee to whom was referred alterations in the Constitution in reference to membership, and the suspended list, reported the following resolution.

*Resolved*, That in view of the disturbed state of the country, the publication of the suspended list for the present year be omitted, and that the Treasurer be requested to correspond with those members, by circular or otherwise, and ascertain their views of continuing their membership for action at the next meeting.

*Resolved*, That it is inexpedient to make any alteration in the Constitution for the present with regard to admitting members during the year..

The question was taken on the resolutions separately, and each of them passed.

Mr. George C. Close, of Brooklyn, New York, now read a volunteer paper, on the use of Chestnut leaves for the Whooping Cough, and exhibited the dried leaves and a fluid extract prepared from them. The paper was referred to the Executive Committee for publication.

At the request of the President, Mr. Milhau, first Vice-President, occupied the Chair for the remainder of the session.

Mr. Mayer now proceeded to read his reply to query No. 27, on Phosphomolybdic acid as a test for alkaloids. Mr. Mayer illustrated his remarks by some experiments. The paper was referred to the Executive Committee for publication.

Mr. Procter now read the answer of Mr. Sharp, of Baltimore, to query No. 50.

Mr. Procter also read a letter from Mr. Dohme, of Baltimore, stating why his paper in answer to query No. 40, was not answered. On motion the latter was referred to the Executive Committee for publication if proper.

Mr. Procter stated that he had received a communication from William S. Merrill, of Cincinnati, in regard to the active principles of Hydrastis Canadensis, and though directed to the Editor of the American Journal of Pharmacy, the paper contained a request that it be submitted to the Association. He believed the paper would be proper for the proceedings by a charge of direction. It was accompanied by a number of beautiful specimens of Hydrastis Berberina, Xanthoxilin, Sulphate of Sanguinarina and other salts, by way of illustration. After some discussion the paper was not received, on the ground of its not being directed to the Association. Subsequently this action was reversed by the adoption of the following resolution :

*Resolved*, That the communication received by the President from Mr. Merrill, in regard to Hydrastis, &c., be referred to him (Mr. Procter) to be modified for publication in the Proceedings.

Alfred B. Taylor, Secretary of the Committee of Revision and Publi.

cation of the new Pharmacopœia, having at the request of the President prepared a few notes, gave an interesting outline of the Proceedings of that Committee during the two years and a quarter that it has been engaged in the work of revision, mentioning their action in regard to weights and measures, Percolation, Powders, and many of the preparations that had been introduced. Mr. Taylor observed that his remarks must be considered strictly verbal, and not to be printed in the Proceedings, as he was not authorized to do so.

The Business Committee now brought forward the subject of the next place of meeting, and offered a resolution, but after considerable discussion by Messrs. Colcord, Squibb, Milhau, Bedford, Kiersted, Procter, and others, the resolution was withdrawn, and the following offered by Mr. Colcord adopted:—

*Resolved*, That when this Association adjourns it shall adjourn to meet on the second Tuesday of September, 1863, at such place as the President and Executive Committee shall determine, due notice being given in the proper Journals.

The Committee on Specimens on exhibition, presented the following Report:

Among the preparations of a pharmaceutical character, we find most conspicuous the fine collection of elixirs, wines, syrups, and glyceroles; the lozenges, pastilles, and other articles exhibited by Edward Parrish, of Philadelphia, who also exhibited an ingenious apparatus for the ready preparation of suppositories.

H. W. Lesley, of Bristol, exhibits preparations of blackberry root and berries, accompanied by an explanatory paper.

James T. Shinn, exhibits specimens illustrating his paper on oil of Benne.

Messrs. Powers and Weightman, of Philadelphia, are represented by a number of their finer preparations of the alkaloids of cinchona, and opium, and metallic chemicals.

Dr. W. H. Pile, exhibits a case of Hydrometers, Alcoholmeters, Thermometers, and other graduated instruments, which show the talent employed on, and the excellence of the manufacture. Edward Parrish exhibits a compact Gas Furnace for pharmaceutical purposes.

A neat nursing bottle is exhibited by Hastell & Letchworth; J. D. Lynde has a patent self-acting valve-stopper for aerated water-bottles; Wright, Smith and Piersoll, an ingenious apparatus for testing coal oils as to their safety for use in illuminating.

There is likewise on the table a fine collection of the Zinc ores used by the Lehigh County Zinc Company, of Pennsylvania, deposited by Prof. Robert Bridges.

J. F. MOORE, Chairman.

The subject of a certificate of life membership was brought forward by the Business Committee as a recommendation of the late President, but the proposition was not agreed to.

At the request of the President, Vice-President Milhan announced the following as the Committee on the Drug Market, viz :

Edward R. Squibb, M. D., of Brooklyn, N. Y., *Chairman.*

William Procter, Jr., of Philadelphia, Pa.

Samuel M. Colcord, of Boston, Mass.

Charles Bullock, of Philadelphia, Pa.

Alphæus P. Sharp, of Baltimore.

The following Report of the Committee to prepare queries for investigation next year was now read by the Chairman as follows :

1. Is there a principle in *Chenopodium anthelminticum* analogous to Santonin, or does the medicinal power of this plant depend wholly upon its volatile oil ?  
*Continued to James Balmer, of Baltimore.*

2. Is there a crystalline active principle in Capsicum, or does it owe its pungency to a soft resin ?

*Accepted by Edward Parrish, of Philadelphia*

3. What progress will have been made during 1862—63 in the collection of tartar in the wine region of the Ohio Valley ?

*Accepted by Mr. J. M. Gordon, of Cincinnati.*

4. What is the relative activity of the root of *Aconitum napellus* grown in the United States, and that imported from Europe, based on their yield of Aconitia, and what objections, if any, exist to the economical culture of the plant in the United States ?

*Accepted by William Procter, Jr., of Philadelphia.*

5. What is the best permanent solvent for Cantharidin suitable for making a Pharmaceutical preparation for blistering ?

*Accepted by J. Faris Moore, of Baltimore.*

6. What are the advantages of the seeds of *Conium maculatum*, as regards uniformity of medical power, as a basis for the medicinal tincture ?

*Accepted by George C. Close, of Brooklyn, N. Y.*

7. The oil wells of Western Pennsylvania—the quantity and quality of oil they afford at present, their prospective value, and the geological characters of the formation wherein the oil is deposited.

*Continued to George W. Weyman, of Pittsburgh.*

8. Does wood creosote exist in the market ? to what extent ? and what are the objections to the substitution of the former by carbolic acid ?

*Continued to Charles Bullock, of Philadelphia.*

9. Has Propylamin as it exists in Ergot any power to produce uterine contraction ; and if so, does commercial Propylamin from herring pickle possess a like power ?

*Referred to Prof Robert P. Thomas, of Philadelphia.*

10. What is the relative proportion of tannin in the indigenous astringents of the United States, used for medicinal and other purposes.

*Accepted by James T. Shinn, of Philadelphia.*

11. What is the true botanical source of Southern prickley ash bark?

*Continued to Prof. Robert P. Thomas, of Philada.*

12. An essay on Tartaric Acid and the medicinal tartrates in their chemical and pharmaceutical relations.

*Continued to Prof. John M. Maisch, of Brooklyn, N. Y.*

13. What course should be adopted by Pharmacentists in view of the present state of the liquor market, as regards factitious brandies and wines?

*Continued to Henry F. Fish, of Waterbury, Conn.*

14. What is the best form and material for a still for use by pharmacutists, of from two to four gallons capacity, appropriate for being heated by gas or stove heat, and which shall be suitable for the recovery of alcohol in making pharmaceutical preparations.

*Accepted by William Procter, Jr., of Philadelphia.*

15. What is the most convenient and economical arrangement by which the apothecary can quickly and reliably ascertain the strength of acid and alkaline liquids for pharmaceutical preparations?

*Referred to Dr. Wilson H. Pile, of Philadelphia.*

16. What is the best method of keeping garlic during the autumn, winter, and spring in the pharmacist's shop, so as to prevent its growth?

*Accepted by E. W. Sackrider, of Cleveland, Ohio.*

17. What are the actual values of the commercial varieties of Buchuleaves, based on the proportion of volatile oil they will yield.

*Accepted by P. W. Bedford, of New York.*

18. It has been alleged that Ipecacunaha is now adulterated with Euphorbia Ipecacuanha, Gillenia trifoliata and other substances. What are the best means of detecting these adulterations of this important drug?

*Accepted by William Wright, Jr., of New York.*

19. Why should not Lactucarium be economically produced in the United States for the supply of commerce?

*Referred to Henry A. Tilden, of New Lebanon, N. Y.*

20. An essay on the best practical means of protecting volatile oils from the injurious action of light and air in the apothecary shop, during the course of their being dispensed.

*Accepted by Alfred B. Taylor, of Philadelphia.*

21. An essay on the actual merits of Sanguinaria as a therapeutic agent based on trials with Sanguinarina and its salts; and its claims to a prominent position in the *Materia Medica*.

*Referred to Prof. Robert P. Thomas, of Philadelphia.*

22. An essay on Fluid Extracts—as regards their preparation, permanence, and eligibility as officinal preparations.

*Accepted by William Procter, Jr., of Philadelphia.*

23. What are the relative merits of White and Black Mustard for use as Sinapisms.

*Accepted by Prof. J. Faris Moore, of Baltimore.*

24. On the pharmaceutical preparations of the Strychnacæ (*Nux Vomica*, *Ignatia Amara*, &c.,) and on the methods in use for the extraction of their active principles.

*Accepted by Prof. Ferd. F. Mayer, of New York.*

25. What is the constitution of the several impure Oxides of Iron used in medicine (as Sub-Carbonate, Iron Rust, &c.,) now in the market.

*Accepted by Ferris Bringham, of Wilmington, Del.*

26. What are the best methods of detecting the adulterations of olive oil?

*Accepted by Jonas Winter, of Baltimore.*

27. Do any of the samples of sulphuric and other mineral acids of American origin contain appreciable amounts of Arsenic?

*Accepted by Prof. John M. Maisch, of Brooklyn, N. Y.*

28. The green sand or marl of New Jersey, according to analysis, contains among other constituents from 10 to 12 per cent. of potassa. Query. Can this potassa be economically extracted sufficiently pure for pharmaceutical and commercial use, so as to compete in price with that derived from wood ashes?

*Accepted by George J. Scattergood, of Philadelphia.*

29. Is the process of dialysis applicable in Pharmacy? If so, in what instances may it be employed.

*Accepted by William Procter, Jr., of Philadelphia.*

30. Observations on the "Internal Revenue Law," in its relations to the business of the druggist and apothecary.

*Accepted by Edward Parrish, of Philadelphia.*

The Committee also recommend the adoption by the Association of the following as *prize essays* for general competition; the prizes to be adjudged by a Committee to be appointed by the Association at its meeting in 1864.

1. For the best essay on *Cimicifaga racemosa*, in its chemical and pharmaceutical relations and medical uses.

2. For the best essay based on a practical and successful experiment on the culture and preparation of *Elaterium* in the United States, accompanied by a specimen of the product of not less than 120 grains.

Respectfully submitted,

WILLIAM PROCTER, JR.,  
JOHN M. MAISCH,  
CHARLES BULLOCK.  
J. FARIS MOORE,  
P. W. BEDFORD.

After some discussion in reference to the prize essays, the Report was unanimously adopted.

Owing to the hurried manner in which these Reports have necessarily to be produced during the sessions, the Chairman of the Business Committee moved that the Committee on questions for investigation be made a standing special Committee to report at the next meeting of the Association—which was adopted.

Edward Parrish here made some interesting remarks on the art of skeletonizing leaves, and its relation to the apothecary's business, and exhibited a beautiful case of bleached specimens called "the Phantom Bouquet."

On motion of the Business Committee it was ordered that all periodicals, papers, exchanges, etc., received by the officers or Executive Committee, be placed at the disposition of the Committee on the Progress of Pharmacy, for use in compiling their Report.

The following resolution was then passed :

*Resolved*, That the thanks of the Association are heartily tendered to the Philadelphia College of Pharmacy and the Pharmacutists of Philadelphia, for the hospitality and kindness extended to the members of the Association during their visit to this city.

The Secretary then read the Minutes of all the sessions, which after amendment were adopted.

The Association then on motion adjourned, to meet, in accordance with the resolution previously adopted, on the second Tuesday of September, 1863, at such place as the President and the Executive Committee may determine upon.

P. W. BEDFORD, *Secretary*.

## Editorial Department.

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**MEETING OF THE PHARMACEUTICAL ASSOCIATION.**—Our readers will find at page 472 the Minutes of the late Meeting in this city, nearly in full, which we publish in anticipation of our November issue, in which number they usually appear. The meeting was small, the attendance, except from New York, being much below the usual ratio. This is chiefly due to the prospect of the military draft occurring on the 3d of September, the postponement not having taken place until too late for the members to reach Philadelphia. As it was, the States of Massachusetts, New York, New Jersey, Pennsylvania, Delaware, Ohio, and Illinois were represented. As the Minutes are full, we will not occupy further space than to say, that the meeting adjourned to meet again on the second Tuesday of September, 1863, the place being left to the decision of the President and Executive Committee.

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**NEW YORK COLLEGE OF PHARMACY.**—At a stated meeting of the Board of Trustees of the College of Pharmacy, of the City of New York, held August 4th, 1862, the following Preamble and Resolutions were passed:

The Board of Trustees of the College of Pharmacy have received the melancholy intelligence of the death of Dr. Wm. H. Milnor, a respected member of this College, and for several terms its efficient Secretary; he having died at Savage's Station, Va., while serving his country in the capacity of surgeon to the Twenty-Second Regiment Massachusetts Volunteers. As evidence of our appreciation of his worth, and from respect to his memory, the Board have

*Resolved*, That in the death of our friend, though for many years separated from us, we feel the more strongly, because it is now final, the loss of his services, his fidelity to our institution, and his genial and intellectual society.

*Resolved*, That a copy of this preamble and resolution be presented to his family.

Copy from the Minutes.

P. W. BEDFORD, *Secretary*.

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*Notes on Chinese Materia Medica.* By Daniel Hanbury, Fellow of the Linnæan Society, &c. Reprinted from the Pharmaceutical Journal, London, 1862. Pp. 48.

This curious and well illustrated little volume has been received from the author, and will, on a future occasion, when we have space to do it justice, receive a farther notice.

*Proximate Analysis of Plants and Vegetable Substances.* By Frederick Rochleder, M. D., Professor of Chemistry in the University of Prague. Philadelphia, 1862. Pp. 80, octavo.

The above work of Dr. Rochleder was originally published in Germany, at Wurzburg, by Stahl, in 1858.

In 1859, Mr. John M. Maisch, now Professor of Materia Medica and Pharmacy in the New York College of Pharmacy, made a translation, and offered it for publication in this city, but it was declined by the Publisher, owing to the limited number of persons by whom such a work is sought.

In May, 1860, the Editors of the *Pharmaceutical Journal*, of London, commenced the publication of a translation by Mr. William Bastick, Pharmaceutical Chemist of that city, in parts of a few pages, which continued with occasional interruption, until March, 1861. Notwithstanding this translation had several defects, it was determined to adopt it as a basis of a reprint, in parts, in the *American Journal of Pharmacy*, Mr. Maisch having, very liberally, agreed to carefully revise the pages, before they were submitted to the printer, by a comparison with the original text. Its publication commenced in that Journal in January, 1860, and was continued until September, 1862, with but one interruption. The work as here presented will be found to vary somewhat from the translation of Mr. Bastick, and it is believed has been rendered clearer.

The subject is exceedingly difficult to convey in the abstract way in which the Author has seen fit to present it, and involves a constant repetition of terms that might perhaps have been partially avoided, and rendered more interesting to the student, if he had adopted the plan of giving actual examples of proximate analysis.

The work is particularly recommended to students of pharmacy, who seek information in preparing their theses, and deserves a place in every chemical and pharmaceutical library. It is for sale by Charles Ellis & Co., 724 Market Street, Philadelphia. Price 60 cents, or post-paid 70 cts. when ordered by mail.

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*The Phantom Bouquet*: a popular treatise on the art of skeletonizing leaves and seed-vessels, and adapting them to embellish the home of taste. By Edward Parrish, of Philadelphia, Member Acad. Nat. Science, &c., Philadelphia, J. B. Lippincott & Co., 1862. Pp. 47, 16mo.

This little volume is intended as a practical manual for those interested in the beautiful art of skeletonizing leaves. It is illustrated with several exquisite wood engravings. After general remarks on the structure of leaves and their relations to the tree or plant, in which the author considers the leaf as a type of the tree in its venation, he proceeds to tell us how and what to collect. The first and important process of maceration is then explained; other processes to meet particular cases then follow, including the natural process of skeletonizing by certain insects, as the "Caddice Worm." After



treating of leaves, seed-vessels and other parts are discussed. The bleaching of the skeletoned fabric of the leaves, etc., comes next, and on the perfection of this, much of the beauty of the "bouquet" depends; and lastly, the mounting or arrangement of the leaves in groups, or "bouquets," is taught. In passing we may venture the opinion that however successful may be the preparatory operations, upon this final disposition of the results depends the real success. Unlimited room for the display of a chaste and delicate taste is here afforded. The author very happily dedicates the volume to his best friend in the following words:—"To my Wife, a pioneer and proficient in the art herein portrayed, this work is affectionately inscribed." It is well printed, and altogether is a beautiful and acceptable addition to the literature of art.

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*The Physicians' Visiting List* for 1863. Lindsay & Blakiston, Philada.

On presenting this little volume to a medical friend, he afterwards handed us the following opinion of its merits, based on a use of previous editions: "The Physicians' Visiting List, by Lindsay & Blakiston, answers every indication required. Being compact, well arranged, and at the same time having sufficient space allotted to the various parts, thus rendering it an invaluable companion of the Physician. Examining it carefully, and thinking over the arrangement of its different parts, I know of no alteration by which it could be improved. To the Physician, with the cares and anxieties of a large practice, it must be a wonderful economist of time and labor."

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WILLIAM H. MILNOR, M. D.—The subject of this sketch was for many years a prominent druggist of New York City. He had previously been a practising physician, but relinquished his profession for one he hoped would prove more lucrative. While engaged in the drug business, he connected himself with the College of Pharmacy, which institution he served faithfully for several terms as its Secretary. Owing to the failing health of his wife, he removed to Richmond, Va., in hopes that she would be benefited. He afterwards returned to New York, and had been living there and in this city till recently. Continued domestic sickness and the failure of his own health, had much harassed and burdened him. Some months since, he accepted the position of Assistant Surgeon to the Twenty-second Regiment Massachusetts Volunteers. Being left at Savage's Station, on the retreat of our forces to the James River, in charge of one hundred wounded men, his health and strength proved inadequate to the task. He gave himself with earnestness to these new duties, but the exposure and physical labor, combined with the limited allowance of food granted them by the rebel authorities, (who had taken them as prisoners,) was more than his weak nature could bear. On the morning of the 24th of July he had dressed an officer's wound, and soon afterward retired to his room for rest.

He was soon seized with a difficulty of respiration, and as his attendants raised him up he suddenly expired. He was buried under the shade of an apple tree, back of Savage's house. Those who knew him in business, will remember him as one who was eminently proficient and enthusiastic in his vocation. His more intimate friends will remember his general worth and consistent Christian character. His family will mourn him as a kind son, a loving husband, and an endeared parent. He leaves a widow and three children, who reside in this city.

B.

# THE AMERICAN JOURNAL OF PHARMACY.

~~~~~  
NOVEMBER, 1862.  
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## ON THE ALKALOIDS OF HYDRASTIS CANADENSIS.

BY WM. S. MERRILL, A. M.

To the Editor of the American Journal of Pharmacy.

I hoped to be able to attend the approaching meeting of the American Pharmaceutical Association, but find I shall not be able to leave home. I have therefore forwarded to you a small package of samples, chiefly products obtained from the *Hydrastis*, and request you will present them to the Association for their examination.

In a business letter to Prof. Parrish, some months ago, I briefly mentioned these. I was not publishing an analysis or writing an essay, but briefly stated the fuller results of our experiments, of which I had previously sent him some samples; and I expressed a willingness to have these statements published, as they contained some facts that I did not suppose had been previously announced. Under these circumstances, I certainly thought some portion of your criticism of the article quite uncalled for.

Our examination of the *hydrastis* was principally made last fall, and I then knew nothing of the analysis of Durand, further than stated in U. S. D., which concludes by saying, "He also discovered a peculiar nitrogenous crystallizable substance for which he proposes the provisional name '*Hydrastin*,' until it shall be determined whether it be, as he suspects, an organic alkali." This is certainly very indefinite, and does not even make it certain which of the two alkaloid bases it was which he discovered.

On the 6th of Feb. last, when sending to Prof. Parrish some samples of *xanthoxylum* bark and other articles for the cabinet which the *Pharmaciens* of Philadelphia were getting up for ex-

hibition at the World's Fair, I enclosed with them specimens of *Hydrastina* and *Mur. Hydrastia*, which we had obtained, and briefly mentioned their leading properties. These were placed in the College cabinet, and there, Mr. Editor, you had seen them so labelled, and refer to them in your note to the article of Dr. Mahla in the Journal of that month. You certainly must have forgotten this, when in your criticism of July, speaking of my report that "the Hydrastis contains *two* distinct alkaloids, which we name Hydrastia and Hydrastina," you say "this assumption is to be discountenanced," because I did not acknowledge the analysis of Durand, and Mahla and Perrins, as previous discoveries. Mr. Durand had discovered but of one these bases, and that hypothetically, and Dr. Mahla's article, which had not then appeared, speaks of but one. The articles of J. Dyson Perrins indeed recognises two, but these were not published in London until the April and May following, and I had seen nothing of them until their appearance in the same number of your Journal with the extract of my letter to Prof. Parrish.

It is evident in regard to all of us that our investigations were entirely independent of the others, and thus far *original*, whichever may be entitled to credit in point of time.

I certainly have no wish to arrogate to myself the merits of other men's skill or discoveries, although I may be remiss in keeping myself posted in regard to them. And lest I be again accused of any such injustice, I beg leave here to state, I have not conducted these recent experiments alone. Fifteen years ago I first introduced to the medical profession, the Podophyllin, Macrotin, Leptandrin, and some others of that class of agents known as the "Resinoids" or "Concentrated remedies," and set the ball rolling in that direction. But the extensive mercantile and manufacturing business in which, in company with my brother, I became engaged, has since so engrossed my attention that I have found no time for the careful labors of chemical investigation and analysis. We have long felt, however, that many of that class of agents must be greatly improved and perfected by accurate and scientific analysis, or else be rejected from the list of medicinal agents, and have fully appreciated the wide field opened in vegetable materia medica, which, whatever may be our ability, we had no time to cultivate. We have,

therefore, employed as an assistant in our laboratory, Prof. H. D. Garrison, a chemist of no mean acquirements, and while he works under our direction, and a good portion of the particular experiments and the steps pursued are at my suggestion, the *manipulations* are almost all performed and the results obtained by him.\*

\* NOTE BY THE EDITOR.—It seems needful to again refer to the subject of Mr. Merrill's paper, in order that we shall be fairly understood, both by the author and reader. The question at issue relates to the discovery of the active principles of the root of *Hydrastis canadensis*. In our July number, we published an extract of a letter to Mr. Parrish with the authority of the writer, Mr. Merrill, and accompanied the paper with a critical note. In that paper Mr. Merrill spoke of the two alkaloids in the *hydrastis*, as though he had discovered them, and applies names to them as though they had not been written of before, he giving the commercial *hydrastin* the name of Durand's alkaloid, *hydrastia*; and calling the latter *hydrastina*; and it was to what we believed to be a disposition to ignore the labors of others that we applied the terms "this assumption is to be discountenanced." Mr. Merrill's explanations tend to modify this belief,

In the present paper, Mr. Merrill says, "It is evident in regard to all of us that our investigations were entirely independent of the others, whichever may be entitled to credit in point of time." "I certainly have no wish to arrogate to myself the merits of other men's skill or discoveries, although I may be remiss in keeping myself posted in regard to them."

Now we will not grant the position, that Mr. Merrill discovered either of the alkaloids, much less both of them, in the proper sense of making a discovery; nor can we admit Mr. Merrill's alleged ignorance of the details of Durand's paper, as an argument in his favor, in view of his knowledge of its existence near at hand, as he himself admits. In 1856, when sending out a collection of the American *Materia Medica* to Mr. Jacob Bell, for the Museum of the Pharmaceutical Society, we wrote to Mr. Wayne, of Cincinnati, for certain specimens not easily obtainable here. In his reply to my letter, Mr. Wayne, under date Cincinnati, May 23d, 1856, says,

... "I have sent you among the lot specimens *sanguinarina*, sulphate of *sanguinarina*, *hydrastin*, and *hydrastia*? I think the last *has all claims to be called an alkaloid*. The specimen is as white as it can be made, much more so than your *pet specimen*, [alluding to a specimen of Durand's *hydrastia* in our cabinet, presented to us in 1851, and which we had shown to him on a previous occasion]. I have a new process for obtaining *hydrastin*, at least I have seen no mention of it. I treat the coarse powdered root with cold water in a percolator. To the infusion I add an acid, generally muriatic acid, which throws down the *hydrastin* as a yel-

In commencing our investigations, therefore, one of the first articles we took up was the hydrastis; and we thought we had acquired a pretty accurate knowledge of its constitution, and had

low powder, along with a pectin-like substance. . . . If the precipitate be now treated with boiling alcohol, only the hydrastin is taken up and crystallizes out upon cooling. By this process much less alcohol is lost than in the process of the Eclectic Disp. [Hill's process] and a much finer looking product obtained."

In regard to hydrastia, Mr. Wayne further says: "After I obtain the *hydrastin* from the cold infusion by an acid, I add to the acid liquor an alkali which precipitates a pale yellow powder, which being dried and treated with ether or alcohol, the hydrastia is taken up, and, upon evaporation, it is deposited in colored crystals, which by repeated solution and crystallization are obtained colorless."

Dr. John King, in the Eclectic Dispensatory, says, page 489—edit. 1859—in speaking of hydrastin (muriate of berberina:) "This elegant and highly valuable article was introduced to the profession by Dr. H. H. Hill, of the firm of F. D. Hill & Co., wholesale druggists in Cincinnati," and the process adopted by that gentleman is given in detail at page 480. By reference to the *advertising* sheet of the Eclectic Medical Journal for January, 1853, page 4, we find the following note attached to the name 'hydrastin' in a list of preparations advertised by F. D. Hill & Co., of Cincinnati, viz. This article, introduced by us one year ago, is one of the finest extant amongst Botanic medicines. In fact it is the quinine of North America." Hence Mr. Hill did not produce his Hydrastin until a year after Durand wrote, because Durand's Thesis was written in the summer of 1850—presented to the College at the session '50—'51, and of course not published till after the spring commencement in the latter year. Mr. Wayne's process is also given in that work, and nothing is said in reference to Mr. Merrill in that connection, albeit he was largely consulted by Dr. King in the compilation of his work. Our own impression had been that Durand's hydrastia was the only alkaloid in the hydrastis, and that the *hydrastin* of the Eclectic Dispensatory was the alkaloid of Durand, disguised by the yellow coloring matter of that author, [since shown to be berberina by Dr. Mahla], and the reader will find in the Pharmaceutical Journal, vol. 16th, November, 1856, page 269, the following note that accompanied the sample of Eclectic hydrastin then sent to London: "*Hydrastin*. A small specimen of this principle, which is used by the Eclectics as a remedy, &c. &c. I believe the yellow color is mainly due to adherent yellow resin or coloring matter, just as piperine is colored by the resin of pepper;" previous reference had been made to Durand's discovery of the alkaloid on the same page. From this it will be seen that at that time neither Mr. Wayne nor ourself had a correct notion of the nature of hy-

briefly reported the result, when Prof. Parrish, in his letter of March 8th, acknowledging the receipt of the specimens, says: "The Hydrastina, and Muriate of 'Hydrastia', (Berberina,) and the salt of Sanguinarina are very acceptable, and are placed in the College cabinet, and adds, 'I suppose you have seen the late analysis of a Chicago chemist, transferred to the American Journal of Pharmacy for the current month. This whole subject of the proximate principles of the hydrastis requires further ventilation.'"

In fact, however, I had not seen the article of Dr. Mahla referred to, and the above word in parenthesis was the first inti-

drastin. Subsequently to this—August, 1857—Mr. H. A. Tilden, of New Lebanon, sent us some samples of vegetable principles, and among them two labelled as follows: "Hydrastin," in silky crystals, and "Hydrastina alkaloid," a yellow amorphous powder. At that time we supposed it also was Durand's alkaloid, with yellow coloring matter, in a pulverized condition, but now, on trial, it is soluble in water to a considerable extent, coloring it yellow, and the solution restores the color of reddened litmus, and it is probably berberina.

Mr. Merrill's allusion to the specimens sent to Mr. Parrish, therefore, have nothing to do in deciding the case, as pure specimens of the same had been in our private cabinet for five years previously, as will be seen above.

It will be observed that Mr. Merrill recedes from his position in his former paper, that hydrastin is not berberina, he having been misled by the impurity of his sample of berberina.

We also wish to remark on Mr. Merrill's views in regard to the naming of those principles. He calls Durand's alkaloid Hydrastina, and the berberina alkaloid Hydrastia. We protest against this suggestion. Durand distinctly claims for his alkaloid (see page 117, vol. 23d, of the Amer. Journ. Pharm.,) if his assertion of its alkaline nature is corroborated, the name of *hydrastia*. Now, as it is the only peculiar alkaloid in hydrastis, it is entitled to that name, 1st, because it was given to it by Durand in 1851, and 2d, because it is the proper derivative for an alkaloid from the name hydrastis. Mr. Merrill argues that because berberina is more abundant in the hydrastis than in other sources, it should be called hydrastia. This will not do, because berberina is found in at least four distinct drugs, and Columbo has equal claims. He also suggests "Xanthia" from its color. This is a beautiful name, and might have been appropriately used at first, but it is not probable that this name will be adopted, as M. Buchner, Sr. and Son, in 1835, described this alkaloid in great detail, and gave it its present name, (see Journ. de Pharm., vol. xxi. page 408.)

Lastly, in justice to Mr. Durand, we wish to remove the impression con-

mation I had that the alkaloid I had named *Hydrastia*, was identical with berberina. The analysis of Mahla was not entirely satisfactory, and I immediately set about having this point further investigated.

From some brief experiments, too crude to be reported as a scientific analysis, I had a long time before satisfied myself that the yellow coloring principle of the *xanthorrhiza* was the same as that of the berberis, but did not suspect their identity with that of the *hydrastis*.

To determine this question, we prepared crystallized specimens of the muriate of berberina, and of our *hydrastia*, and subjected them to a series of comparative experiments, and these *then* led us to the conclusion, that although similar, they were not identical. Among these experiments were the following :

1st. Equal quantities of these muriates were dissolved in a dilute solution of potassa. That of *hydrastia* remained unchanged in color, whilst that of berberina became hyacinth red, and these colors remained at the end of five days.

2d. Equal portions were dissolved in equal quantities of boiling alcohol. On cooling, the muriate of *hydrastia* soon formed large stellar crystals, and when cold became semi-solid. The berberina solution when cold, showed only a cloud of extremely fine crystals. And as far as tried, this salt of berberina appeared more soluble in all cold menstrua, than that of the *hydrastia*.

3. To equal solutions in alcohol, tincture of iodine was added. In

veyed in the paper of Mr. Merrill, that Durand's description of his alkaloid was very indefinite. So far from this being the case, he describes three distinct processes for obtaining it, proves its alkaline reaction, its crystalline form, its saturating power, its precipitability by tannic acid and ammonia, its total destructibility by heat, and its nitrogenous nature. The only reason he hesitated to call it an alkaloid was the fact of its salts not crystallizing. Now on this point Mr. Merrill says it forms salts, "that are very soluble, and difficultly, if at all, crystallizable," and hence he corroborates Durand, and removes the only reason why he hesitated to call his product *hydrastia*. With these explanations of the past history of these principles, we are prepared to accord to Mr. Merrill and Prof. Garrison all credit due them for their investigations of these principles in the pages which follow, as a valuable contribution to the knowledge of the subject.



the hydrastia solution, large crystals soon appeared, and continued to form until the whole was a solid mass. Those under the microscope appear long, slender, and bright yellow. The berberina solution slowly evolved fine crystals, much less copiously, and these under the microscope have a *brownish* hue.

The behaviour with iodide of potassium was much the same, and the distinctions similar.

4. Equal solutions were treated with neutral acetate of lead. Both gave copious yellow precipitates, but that of the berberina appeared perfectly amorphous under the microscope (of 150 diam.) while that of the hydrastia was resolved into a mass of silky crystals.

Several other similar tests were applied, some of which showed no appreciable difference between the two salts, while in others differences were discovered that tended to confirm the conclusions drawn from the above, and named in our letter of June, viz., that the two bases were not identical. We did not resort to ultimate analysis, for want of suitable apparatus.

We have not been able to repeat or extend these experiments for want of suitable material from which to prepare a better specimen of berberina. But we have since prepared the muriate of the alkaloid base of the xanthorhiza, of which we send you a sample labelled, "*mur. xanthia*," and this we have satisfied ourselves is identical with that of the hydrastia, and this fact, together with the analyses of Mahla and Perrins, leads us to believe our experiments above stated to be delusive, in consequence of some imperfection in our preparation of the berberina, of which we had but a small quantity. Hence we admit the conclusion of Mr. Perrins, that the yellow coloring principle of the hydrastis, the berberis, and the xanthorhiza, are in all probability identical.

What then is the appropriate name of this beautiful alkaloid? The hydrastis is by far its most copious source, and that from which it will, no doubt, be chiefly obtained; and on this account should have the preference in giving it its name. Moreover, its salts will, without doubt, become important agents in the materia medica, and it is very desirable on this account that its name should point to the plant from which it is derived. These I think strong arguments, especially the latter, in favor of the

name "*Hydrastia*," which I proposed for it. On the other hand, the other alkaloid, which as yet is known to be found in this plant only, must naturally receive its name from it, and the similarity between the names *hydrastia* and *hydrastina* may lead to confusion and mistakes. It may also be considered partial to derive from one plant the name for a principle that is found in several. If these objections should be considered paramount, then I suggest for it the name *xanthia*, from the Greek *xanthos*,—yellow,—a most appropriate name, as it is the only alkaloid known of a bright yellow color.

But although this article is already sufficiently extended, I have not yet reported the processes by which we have obtained these preparations. These are in general indicated in the essays of Mahla and Perrins. But without going over the various experiments we have tried, and the possible processes that may be pursued, I will briefly state those which we have found most simple and eligible.

1st. The ground root may be exhausted, (and this is best done by percolation,) either by alcohol, dilute spirit, or even water.

If it is desired to obtain and preserve the dark resinoid principle which is abundant in the root, and is not without some medicinal value, then alcohol of ordinary strength must be used, adding water at the last to drive out the spirit that it may be recovered. The alcohol must then be distilled off, and the resinoid, (which should be named *hydrastin*,) be allowed to settle, and be removed and dried.

2d. To the clear solution, whether obtained by alcohol or water, add hydrochloric acid, as long as a precipitate is formed, or until the liquid is distinctly sour.

This combines with both bases, but the muriate of *hydrastia* (or *xanthia*) being sparingly soluble in water, or cold alcohol is precipitated as a bright yellow powder, and is collected and washed on a filter. A precipitate may be obtained by other acids, and by many salts, especially the muriates, but the most satisfactory results are by free muriatic acid. The impure muriate thus obtained is purified by dissolving it in hot alcohol, and treating it with animal charcoal, as described by others. The clear solution on cooling crystallizes in beautiful acicular yellow crystals.

From this all the other salts are readily obtained by processes that will suggest themselves to every chemist. They mostly crystallize in needle-shaped or feathery crystals, and are all of a brilliant yellow color.

A little of the pure base *hydrastia* was obtained by withdrawing the acid from the sulphate by baryta, or what succeeded better in our hands, by oxide of lead. The pure alkaloid is uncrystallizable, but combines readily with all acids which we have presented to it.

The other alkaloid which we had named "*hydrastina*," is still in the mother liquor. From this it is precipitated in its basic condition by an alkali, say soda or ammonia, which combines with its organic acid, or the hydrochloric acid with which it is now combined, and let it fall as a greyish white powder, as it is wholly insoluble in cold aqueous fluids. This is purified by repeated solution in boiling alcohol, and crystallization from it on cooling. It crystallizes in large, quadrangular prisms, with very acute pyramidal summits, and when pure are white or colorless. Although itself is quite insoluble in water, and is easily crystallized, it readily combines with all the acids, and forms salts that are very soluble, and difficultly, if at all, crystallizable : presenting in these respects exactly the reverse of the other alkaloid.

When the preservation of the resinoid principle is not desired, these alkaloids may be more economically obtained by exhausting the ground root with dilute sulphuric acid, instead of alcohol, as the sulphates of both of them are readily soluble, but the process is somewhat more circuitous and complicated, and I will not extend this already too long paper to describe it.

We have isolated the organic acid with which these bases are combined in their normal state, but not in sufficient quantity or purity to enable us to determine whether it be a distinct principle, or is identical with some of the vegetable acids already known. If time permits, we will investigate that matter farther.

Submitting these remarks, I remain, yours truly,

WM. S. MERRILL, A. M.

Cincinnati, August 25th, 1862.

## ON THE CULTURE OF THE ELATERIUM PLANT.

BY ROBERT P. THOMAS, M. D.

(From the Proceedings of the American Pharmaceutical Association.)

Can Elaterium be produced in the United States? and if so, is the indigenous product equal in power to the English drug?

A satisfactory determination of this question can only be made by a person having convenient access to a rural district, and sufficient leisure to watch the ripening of the fruits, and to collect them at the proper moment. Having been unable to give personal attention to the growth of the plants, the writer made an arrangement with a relative in Germantown to undertake their culture, and procured an ounce of the seeds from England for the experiment. Small as this quantity seems, it would probably have answered the purpose had we been possessed of sufficient practical knowledge of the proper time for planting.

In August, 1850, I plucked a single fruit from a vigorous plant in Dr. Wood's garden, and kept its seeds until the following May, when they were planted in garden soil in a warm situation. Vigorous plants sprang from these seeds, and furnished well-matured fruits in the latter part of August and the early part of September. Most of the fruits were collected for class exhibition. A few, however, dropped on the ground, and in the following year a larger crop appeared spontaneously,—thus showing that the seeds will survive our winter months. Misled by this observation as to the hardiness of the seeds, I made the mistake of having those from England planted on the 25th of April, last year. This period proved premature, as not a single plant appeared. Cold, wet weather followed, and the seeds rotted in the ground. A few, that had been left, were planted on the first of June. These produced plants, more or less vigorous, according to position and exposure. For instance, those upon high ground, and in situations exposed to the sun, were strong and vigorous; while others, upon a shady hill-side, were dwarfed and stunted. The fruits of the former were large and perfect, while the latter remained small and

green. The quantity obtained was too little for any attempt at the preparation of *Elaterium*.

Arrangements were made for renewing the experiments the present year, but absence from home with the Army of the Potomac, at the proper period for planting, interfered with the design, and, as a consequence, I am unable to answer the question referred to me by the Association.

Something, however, in the way of experience has been gained, which will prove useful to other observers, more favorably situated, in the prosecution of the inquiry. In England, according to the late Mr. Jacob Bell, the seeds are sown in March, and the seedlings planted in June. My best results were obtained by placing the seeds in pots towards the last of April, and setting out the plants in rich warm soil in the latter part of May, or beginning of June. When thus managed, the *Momordica Elaterium* thrives vigorously in our climate, and I do not entertain a doubt as to its yielding a large amount of active principle.

*Philadelphia, August, 1862.*

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## ON THE RESINOID MATTER OF COLOCYNTH.

By JOHN FABER.

(From the Proceedings of the American Pharmaceutical Association.)

Has the resinoid principle of *Colocynth*, extracted by alcohol, a reliable and constant therapeutic power, and may it be advantageously employed in medicine?

2½ lbs. *Colocynth* were deprived of the seeds and the pulp, weighing 10 ounces, treated with 90 per cent. alcohol, the result being a resinous product, weighing 1½ ounce. Follows specimen.

As the medicinal action could only be investigated by the physician, I distributed it among my acquaintances, put up for their convenience in ¼, ½ and 1 grain pills, but failed to get a report, the majority of them being afraid of the violent action, while some of them that had sufficient interest in the

matter, and had the opportunity to try it in one of our public institutions, were prevented from doing so by assuming patriotic duties.

While I beg to have the subject continued to me for another year, I shall mention that the Prussian Dispensatory has an alcoholic extract of Colocynth made with an alcohol of 0.895 sp. gr., the effect of which is described as: *Vis, vehementissime laxans*. It acts sufficiently in  $\frac{1}{4}$  grain doses, and in  $\frac{1}{2}$ , 1 grain doses, most powerfully purging and vomiting.

The yield of this extract was  $3\frac{1}{2}$  ounces from 10 ounces of pulp, containing besides resin a good proportion of extractive matter.

From my own personal experience in dispensing this alcoholic extract, I am enabled to say that its effectiveness is not impaired by time or age. Follows specimen.

*New York, August, 1862.*

#### GLEANINGS FROM THE FRENCH JOURNALS.

BY THE EDITOR.

*Chemical Characters of Bile.*—M. Noel, of Rheims, has analysed some bile furnished by a biliary fistula, with the following results :

Water	.	.	.	.	.	98.764
Cholesterine	.	.	.	.	.	0.021
Carbonate of soda	.	.	.	.	.	0.110
Chloride of sodium	.	.	.	.	.	0.600
Chloride of ammonium	.	.	.	.	.	0.016
Sulphate and phosphate of lime	.	.	.	.	.	0.015
Phosphate of soda, soda salts of fatty acids and of cholic and choleic acids, of Strecker	}					0.474
Coloring matter						
						100.000

Various reagents have been recommended for detecting smaller quantities of bile in the liquids of the animal economy. M. Pettenkoffer has advised the employment of a mixture of

sugar and sulphuric acid; this reagent has proved very uncertain. The author has obtained much more satisfactory results with pure nitric acid, and more certainly than with nitroso-nitric acid which is indicated; the application is very simple. A fragment of Berzelius paper is dipped for a few moments in the liquid to be examined, and then dried in the air. It is then touched with a rod dipped in pure nitric acid, when the presence of bile is indicated by the production of a violet color, which passes to red and afterwards to yellow.—*Journ. de Chim. Méd.*

*Saccharine Secretion of the Flowers of the Crown Imperial.*—The nectaries of this plant secrete colorless transparent drops of a liquid, sweet to the taste, and free from odor, bitterness or acrimony. The liquid is composed of water, sugar of grapes, uncrystallizable sugar, and a little mucilage, without any of the astringency or acrimony of the plant itself.—*Journ. de Chim. Méd.*

*Purification of sulphate of copper from Iron.*—Agitate a solution of the impure salt with recently precipitated subcarbonate of copper. On allowing the liquid to rest, all the iron will be separated as a carbonate and the filtered solution contains no trace of iron.—*Journ. de Chim. Méd.*

*On Spoiled Wine.*—M. Nickles, in a paper published in *Journal de Pharmacie*, August, 1862, asserts that spoiled or altered wine contains propionic acid, and a larger proportion of potassa than good wine, and that this is due to the fermentation of a portion of the tartaric acid of the tartar, during which a certain portion of the tartar of the wine cask disappears, producing propionic acid.

*Galic acid in red Wine.*—M. Simmler, *Jour. de Pharm.*, Aout. 1862, having suspected the presence of gallic acid in this wine, tried the red wine of the Grisons, by removing its tannin with isinglass, and then applying sesquichloride of iron, and obtained a greenish-brown coloration, becoming violet-black by exposure to the air.—*Journ. de Pharm.*

*On a mode of distinguishing Tartaric and Citric Acids.*—Digest the suspected acid with hydrated sesquioxide of iron in a

test-tube ; afterwards carry it slowly to ebullition, allow the excess of oxide to deposit, and decant the clear supernatant liquid. Evaporate this solution to a syrupy consistence ; if the acid is citric, the liquid is limpid and of a beautiful red ; if, to the contrary, there is tartaric acid present, the liquid becomes cloudy and deposits a pulverulent combination of tartaric acid and sesquioxide of iron.

This reaction is sensible in detecting 1 per cent. of tartaric acid.—*Zeitschrift für Chem. und Pharm. and Journ. de Pharm.*

*Beet-root Salts, and their use in Saltpetre manufacture.*—M. H. Schwartz (Polytech. Centralblatt) says that the *vinasse* or liquid left in the still when fermented beet-juice is distilled for alcohol, when evaporated to dryness, calcined to remove organic matter, and lixiviated, yields, to water, the following salts : carbonate of potassa, carbonate of soda, chloride of potassium, sulphate of potassa, and small quantities of ferrocyanurets, formiates, and sulphocyanurets. By the evaporation of this solution the sulphate of potassa precipitates first, and the chloride of potassium crystallizes during the cooling of the liquor, accompanied by the larger portion of the ferrocyanuret. The mother water evaporated to dryness produces a grey mass, which by expression becomes red, from the oxidation of iron present. By lixiviation and filtration, the carbonated alkaline salts are obtained white by evaporation. This impure carbonate of potassa may be employed in the preparation of saltpetre by double decomposition with nitrate of soda and crystallization.—*Journ. de Chem. Méd.*

*Action of water on the mineral salts of vegetable substances.*—

M. A. Terreil, in a note to the Academy of Sciences, says that the phosphate of lime and magnesia exist in plants in a peculiar condition, that they are soluble in water through the agency of organic matter, and can then be moved easily in the circulation of the vegetable and deposited in the parts where they are required in its development.

From this fact the author infers

1st. That the products of macerating, infusing and decocting medicinal plants, owe perhaps a part of their action on the economy to the phosphoric acid and phosphates that they contain.



2d. That the phosphate of lime of bone, also that of magnesia contained in the urine of animals can only come from the phosphates that vegetables contain in a soluble state which circulate in the economy through the agency of liquids absorbed by the organs of nutrition.

3d. That the absorption of insoluble phosphates by plants is effected by aid of organic matter contained in the soil, and which render said salts for the time soluble in water.—*Journ. de Chem. Méd.*

*Analysis of chocolate.* M. Alfred Mitscherlich has found in 100 parts of Guyaquil cacao, 45 to 49 per cent. of butter; 14 to 18 of starch: 0.34 glucose; 0.26 cane sugar; 5.8 cellulose; 3.5 to 5 coloring matter; 13 to 18 albuminoid matter; 1.2 to 1.5 theobromine; 3.5 ashes; 5.6 to 6.3 water. *The proportion of starch is very considerable*; it is a fact not to be overlooked by experts who find chocolate mixed with feculent substances. The coloring matter appears to be an altered product, because the fresh seeds are white. Theobromine is found in the shells of the cacao which contain one per cent. of their weight.

*Labels to aid the Pharmaceutical Student.*—M. Barbot, of Saintes (*Jour. de Chim. Méd.*), suggests the idea of throwing together in the form of a square label a succinct account of the preparation contained in each bottle so that the apprentice can always be put on his guard and have an instantaneous reference on every occasion of handling a bottle. The following is a sample:—

**SCAMMONY.** A gum resinous concrete juice yielded by  
*Convolvulus scammonia.*

**FAMILY,** Convolvulaceæ.

**SOURCE,** Aleppo.

Substance **POISONOUS** in large doses.

**PROPERTIES,** Purgative, Drastic.

To be **SOLD** only on **PRESCRIPTION**.

**USE,** internally, in the dose of 2½ to 15 grs. in pills, bolus, and emulsion.

**COST** per lb. . . . . **SOLD** at . . . . 1 dr.    1 oz.    4 oz.    lb.  
No. . . . .

*On the presence of Nicotina in human viscera.* M. Morin, of Rouen, examined the lungs and liver of a man sixty-six years old, who continued the use of tobacco till his death. The lungs and liver were each treated with acidulated water, after being cut in little pieces, for several days, filtered through paper free from carbonate of lime, and concentrated to one-third of its volume, filter—add excess of alcohol, filter—regain the alcohol—add excess of caustic potassa, agitate with ether—decant the ether and evaporate, when an acid residue possessing the odor and taste of nicotine was obtained which comported itself with tests so as to be identified with that alkaloid.—*Jour. de Chim. Méd.*

*Fumigating cones or pastilles.* Dr. Felix Roubaud has published Dr. Corbel-Lagneau's formula for these preparations used in phthisis, asthma, and other affections of the respiratory organs.

#### *Cones of Iodine.*

Take of Iodine	.77 grains,
Marshmallow powder	10 drachms,
Nitrate of potassa	8 " 45 grains,
Alcohol, water, each	q. s.

Triturate the iodine with sufficient alcohol till reduced to a very fine state of division; add the nitre and marshmallows, and make an intimate mixture, and by means of water form a paste sufficiently firm to manipulate, then form it into ten cones of equal size and shape. Lastly dry them.

In the same way prepare *Cones of Iodide of Sulphur.*

#### *Cones of Cinnabar.*

Take of Marshmallow powder	ten drachms,
Saltpetre	ten drachms,
Cinnabar	five drachms,
Water	q. s.

Mix to a firm paste and divide into ten cones.

#### *Cones of Stramonium.*

Take of Powdered stramonium leaves	10 drachms,
Saltpetre	10 drachms,
Marshmallow or Itycopodium	2½ drachms,
Water	q. s.

Make sufficient mucilage with water and marshmallows to form

with the other substances a consistent mass and divide it into ten cones.

In the same way prepare *Cones of Belladonna and Digitalis*.

*Cones of Tar.*

Take of Purified tar	450 grains,
Powdered marshmallow	525 "
Saltpetre	525 "

Mix and divide into ten cones.

In the same way prepare *Cones of Tolu*.

*Cones of Opium.*

Take of Marshmallow powder,	
Saltpetre in powder, each	ten drachms,
Opium, powdered	39 grains,
Water	q. s.

Mix and make ten cones.

*Cones of Camphor.*

Take of Powdered camphor	450 grains,
Powdered saltpetre	450 "
Powdered marshmallow	750 "
Water	q. s.

For ten cones.

Besides these cones of *sugar, poplar buds, benzoin* and of *oxide of zinc* are recommended.

All these cones after preparation should be dried in a stove and preserved in a dry place.—*Jour. de Chim. Méd.*

*Preparation of Mercurial Ointment.*—Eugene Renoult recommends the following method (*Jour. de Chim. Méd.*) for preparing quickly this ointment:—

Take of Lard and mercury, of each	16 ounces,
Ether	an ounce.

Into a mortar of marble or iron put the mercury with one half the lard, and half the ether, and triturate quickly. Under the influence of cold produced by the vaporization of ether, the mercury is divided into minute droplets and is promptly absorbed. The other part of the ether and lard are then added, and the trituration continued until the mercury is completely extinguished. The ointment is left in contact with the air for

five or six hours, with the precaution to agitate it from time to time so as to favor the vaporization of the last traces of the ether,—when it is finished.

*Candles for poisoning rats.*—M. Séverin Caussé (d'Alby) has adopted Tartar Emetic as a rat poison. To prevent mistakes, he has given the poison the form of candles; here is the formula:—

Suet	786 grains,
Tartar Emetic	153 “
Euphorbium	51 “
Cotton	10 “
Aventurine	a pinch,

Make into thirty-two candles.

Admitting the mixture to be perfect, each gramme of suet (15 grs.) contains 15 centigrammes ( $1\frac{1}{2}$  grs.) of Tartar Emetic and  $\frac{1}{2}$  a grain of Euphorbium.—*Jour. de Chim. Méd.*

#### ON THE PUBLICATION OF THE REVISED PHARMACOPŒIA.

By EDWARD PARRISH.

Two and a half years have now elapsed since the Convention met in Washington, to give official sanction to the decennial revision of the National Standard, and we are not yet publicly apprised of the changes which have met the approval of the Committee, and are to be binding upon us all until the time of the next decennial Convention.

It is with no disposition to find fault with the Committee of revision, and I hope with a full appreciation of the difficulties attendant on the trust committed to them, that I design in this paper to give a concise statement of the reasons urged on all hands as calling for the speedy publication of the work.

1st. The Pharmacopœia of 1850 is universally felt to be behind the times; in fact the holding of the Convention of 1860 and the appointment of the Committee of revision and publication, are evidences of this universally admitted fact.

2d. Sufficient is known of the proposed modifications, to have unsettled the practice of many Pharmacutists and to have interfered with the uniformity which it is the object of the

Pharmacopœia to secure. The publication in advance of many proposed changes, the labors of several Committees of Revision, the report of one of which was published previous to the Convention—the use of many of the proposed new official formulæ by the College of Pharmacy of Philadelphia, in the preparation of the Cabinet forwarded to the Great Exhibition in London, and the unofficial announcement of the proposed changes, made in detail by a member of the Committee of Revision at the late meeting of the American Pharmaceutical Association, have all tended to this unsettlement.

3d. The present season of the year is one in which the want of the new National Standard is particularly felt by the teachers and students at the several Medical and Pharmaceutical Schools. To teach as official, formulæ ten years old, which are about to be superseded, to classes just receiving their first instructions in *Materia Medica* and Pharmacy, could only be justified by absolute necessity.

4th. Whatever may be the fact, there is a general impression that no such necessity exists, the ordeal through which the proposed changes have passed, first in the preliminary revisions, which were carefully conducted by competent physicians and pharmacutists, and with the advantages of discussion in large Committees; secondly, through the journals, where some of them have been ably presented and discussed; and thirdly, in the Committee of final revision which has met weekly during nearly all of this long period, and has verified results by many experiments and the most careful scrutiny, must have been ample for every necessary purpose. So thinks every pharmacist and physician outside the Committee with whom I have conversed.

5th. The progressive spirit of our age and country is at war with every delay which appears unnecessary, and especially with a delay that might be construed as involving an uncertain or precarious idea of Nationality. Let us have our American Pharmacopœia which will doubtless be more characteristic and distinctive than ever before, and which it is to be hoped will come in time to be stamped upon the memory of the thousands of young men under instruction during the present winter term, as candidates for the medical and pharmaceutical professions.

Moreover let us have a large edition, cheap as becomes a brief and concise work, edited without expense, and let it be so thoroughly advertised and introduced, that it will cease to be as formerly a curiosity in drug stores and the offices of physicians, not one of which can with propriety be without it.

### ON THE WEIGHT OF A FLUIDOUNCE OF WATER.

By DR. W. H. PILE.

The problem of reducing weight to measure, as in the determination of the weight of a definite bulk of water, although apparently a very simple operation, involves processes so complicated and delicate, that the question is still an open one, notwithstanding the most acute observers of modern times have entered into the investigation and pursued it diligently for years. The governments of England and France, and we may add our own also, in their endeavors to have this fundamental inquiry settled, have employed the utmost skill and ingenuity available, in devising mechanical means for overcoming difficulties; some of these are, however, in their very nature insurmountable, and the utmost that we may expect is a nearer approach to accuracy as modern science devises new means, and more refined investigations are instituted.

The above remarks are made introductory to a question referred to me, as to the weight of a fluidounce of water, and the determinations of various authorities on this point are given below, collected from such sources as I have been able to meet with.

The United States (see Alexander on weights and measures) define a gallon of water, of 231 cubic inches, at its greatest density, 39.83° F., and Bar. 30 inches, to weigh 58872.1754 troy grains and the fluidounce 456.0826 gra.

According to Kopp's table on the expansion of water, reduced by myself, (see Amer. Jour. Phar. for 1860) when a bulk of water is assumed to weigh 1000 gra. at 60° F., a similar bulk will weigh at its greatest density 1000.902 gra. The fluid ounce of the United States standard at 60° F. would consequently weigh  $\frac{456.0826}{1000.902}$  or 455.6216 grains.

In the Dispensatory by Wood and Bache, the fluidounce is

stated to weigh 455.6944 grains. This result appears to be derived from Sir G. Shuckburg's experiments, which give the cubic inch of water at 60° F. as 252.506 grains; the fluidounce, therefore would equal  $\frac{281}{128}$ , or 455.6944 grains.

In a report to the British House of Commons in 1821, (see Penny Cyclopedia, art. Standard,) the cubic inch of water at 62° F. is declared to weigh in vacuo 252.72 grains of the standard pound of 1758,\* while in a final report made 1835, adopted and at present in force, the cubic inch of water at 62° F. weighed in the air, with brass weights, bar. 80 inches, equals 252.458 grs. or the fluidounce 455.6094 grains. This latter weight reduced to the temp. of 60° F. by Kopp's table as above, would equal 455.6910 grains. Reduced by other tables the result would vary slightly.

The question is thus seen to be not susceptible of a definite answer, and although the true result may be classed among the constants of the mathematician, yet obstacles to its rigid determination will ever remain insuperable.

By comparing the results as above given, we

find at the temp. of 60° F. and Bar. 80 in.

the United States standard fluid ounce	455.6216 grains.
Sir G. Shuckburg . . . . .	455.6944 “
British standard . . . . .	455.6910 “
Average weight (mean of the above,)	455.6690 “

## ON THE JUICE OF THE FRUIT OF SOLANUM LYCOPERSICUM (TOMATO.)

By JNO. BAPT. ENZ.

The fruit of the *Solanum lycopersicum*, cultivated in the gardens at the foot of the Donnersberg, and which in its fresh ripe condition is of a beautiful scarlet red color, was collected, bruised in a stone mortar with a wooden pestle, and placed in

\*As an historic fact it may be mentioned, that the great fire which destroyed the British Houses of Parliament in 1834, also destroyed the standard weights alluded to in the act. As this loss has never been replaced, there is consequently no legal standard at present in Great Britain.

a warm situation for three days. The juice was then strained off, with expression, and filtered.

The filtrate was of a wine color, clear and strongly acid. By boiling it was coagulated. By a second filtration the coagulum was separated, but it amounted to so little that I was obliged to limit myself to but a single experiment. I heated it, after washing and drying, in a glass tube closed at one end, and noted the appearance of alkaline vapors, smelling like heated horny matter, indicating albumen.

The filtered juice reacted as follows, viz.

Ammonia produced, in the cold, no change; on boiling, a white pulverulent precipitate.

Solution of potassa—a reddish brown color; on boiling, a flocculent precipitate.

Nitrate of silver—a dense cloud; and on standing, a light precipitate, which did not entirely dissolve in nitric acid.

Chloride of barium—gradually a precipitate not entirely soluble in muriatic acid.

Chloride of calcium, chloride of iron, ferrocyanide of potassium, produced no change in the juice.

Oxalate of ammonia threw down immediately a dense, firm precipitate—this being filtered off, phosphate of ammonia caused a slight precipitate.

Tartaric acid produced a crystalline deposit.

Lime water occasioned gradually a slight turbidity; on boiling, a white flocculence separated, which was partly soluble in a solution of sal ammoniac. The portion not soluble in sal ammoniac, dissolved, after washing, in dilute nitric acid, in which solution molybdate of ammonia produced a citron yellow precipitate.

After lime water had thus thrown down a white flocculent precipitate by boiling, the mixture was, upon cooling, immediately filtered, and the filtrate boiled. No turbidity was produced,—the solution remaining as clear as water. I conclude from this that no citric acid is contained in the juice.

Neutral acetate of lead caused a dense white precipitate: this was partially dissolved in acetic acid. Boiled with water and filtered while hot, the filtrate deposited, on further dilution with water and cooling, a small amount of a crystalline powder.



That portion of the precipitate by acetate of lead, insoluble in water, was, after washing and drying, found to be entirely soluble in liquor potassa and in nitric acid.

This precipitate by acetate of lead, when powdered, and heated in a dish, became blackened. On treating the blackish mass with dilute acetic acid, a residue remained, which, heated on charcoal, threw out polyhedral particles.

Another portion of the precipitate by lead was digested with a solution of carbonate of ammonia. The yellowish white filtrate separated from the carbonate of lead did not yield, upon the addition of acid in excess, any gelatinous mass of pectic acid.

The liquid separated from the precipitate by lead, yielded upon the addition of the basic acetate of lead only a slight yellow colored precipitate, which washed, decomposed by sulphuretted hydrogen, and filtered off from the sulphuret of lead, gave an acid liquid producing no reaction with lime water in the cold; on boiling, a flocculence separated, which did not disappear on cooling. A part of the acid liquid was evaporated to a syrup, and mixed with alcohol, whereby white flocks of gum were thrown down.

The liquid separated from the precipitate produced by the basic acetate of lead was freed from excess of lead by carbonate of ammonia, and the filtrate evaporated to a syrupy consistence. A reddish brown mass of sweet, sour, salty though not bitter, taste is left, which was almost entirely dissolved in alcohol.

A solution of sulphate of copper mixed with tartaric acid, added to the filtrate previously made alkaline, produced a considerable yellowish red precipitate. Lime water made no further change, neither in the cold, nor on heating. Chloride of barium did not affect it. Nitrate of silver was immediately blackened.

With the remainder of the concentrated filtrate a reaction was attempted with lactic acid, but with negative results.

A portion of the juice of the fruit was evaporated to a syrupy consistence, and, since nothing crystallized from it, digested with ether. The ethereal solution separated from the syrup was of a golden yellow color: it was evaporated to dryness, and the mass treated with water. The aqueous solution left behind a small amount of resinous matter: filtered from this, it possessed

a yellow color, and clear acid taste. Sugar of lead caused a yellow flocculent precipitate in it, which collected together upon heating; and was entirely soluble in acetic acid. Chloride of zinc produced no alteration in the cold; upon heating, a flocculent turbidity.

The residue of the extract was now treated with alcohol, which, however, left a considerable portion undissolved.

The alcoholic solution, slowly evaporated to dryness, yielded a mass which, with the exception of a very minute quantity of resin, was soluble in hot water. After cooling and filtering, the liquid possessed a reddish brown color, was clear, and had a sweetish acid taste.

A solution of sulphate of copper mixed with tartaric acid produced in the filtrate previously rendered alkaline, when warmed, a considerable yellowish red precipitate.

A portion of the filtrate was mixed with a few drops of chloride of iron, heated nearly to boiling, liquor potassa added, boiled and again filtered. In this filtrate the presence of iron was indicated by a black precipitate with sulphuretted hydrogen.

From this I infer the presence of tartaric acid; there had been formed the tartrate of iron and potassa, which remained in solution by the presence of free alkali, and yielded its iron only upon the addition of sulphuretted hydrogen. At least neither malic nor citric acid would have afforded an alkaline solution *containing iron* under these circumstances.

Another portion of the aqueous solution of the alcoholic extract, mixed with sugar of lead, gave a flocculent precipitate, which collected upon heating, and dissolved with but a very small residue in acetic acid. The remainder of the aqueous solution of the alcoholic extract was evaporated to the consistence of an extract, and heated in a test tube with a few drops of sulphuric acid—frothing was produced, and the disengagement of pungent acid vapors of malic acid—which crystallized upon the cooler part of the tube.

The portion of the ethereal extract insoluble in alcohol dissolved completely in water, forming a clear reddish brown solution. This solution was insipid to the taste, somewhat salty, neither bitter nor astringent. Chloride of iron produced in it no change.

Acetate of lead caused immediately a flocculent precipitate, partly soluble in acetic acid.

Mixed with potassa and a solution of sulphate of copper, a deep bluish green solution, without any precipitate, immediately was formed, not changing by standing; upon boiling, a red crystalline precipitate of oxide of copper was promptly deposited.

When a half ripe fruit is cut in two, and moistened with a few drops of tincture of iodine, a blue color is immediately produced.

A decoction of the fruit with tincture of iodine gives a dark blue precipitate.

According to the foregoing examination the juice of the fruit of *Solanum lycopersicum* contains the following substances:

Potassa, lime, and some magnesia, in combination with malic, tartaric, phosphoric, and sulphuric acids, chlorine, a gum resembling dextrine, albumen, starch, cellulose, fatty and resinous matters, red coloring matter, and sugar.

Solanin could not be found in the juice; this would have been betrayed by its bitter, nauseous, harsh taste. The seed, however, yielded an alcoholic extract of a bitter and penetrating taste, containing probably solania, with which I propose making further experiments.

The aqueous solution of the contents of the retort deposits a Kermes colored powder, which, when washed with diluted alcohol, is slightly dissolved, yielding a brownish red colored liquid.

Finally 6 ounces of the juice freshly strained from the ripe fruit, moistened with phosphoric acid, were subjected to distillation. The distillate reacted and tasted decidedly acid, but did not decolorize the indigo solution; it gave upon neutralization with caustic baryta, filtration and subsequent evaporation, a salt, which when wet with sulphuric acid, in the presence of one of the organic ethers, evolves a distinct odor of acetic acid.—*Vierteljahresschrift*, xi. *Band 3 Heft*.  
G. J. S.

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## ON THE CHEMISTRY OF OPIUM.

By DR. T. ANDERSON.

Since the year 1808, opium has attracted the attention of chemists; of late years the principal point aimed at had been

the preparation of morphine in a pure state. In extracting the opium in order to obtain the bases, it was better to use only a small quantity of water heated to about  $150^{\circ}$  F., in which case all the narcotine would be dissolved out, and only woody fibre left; but if a large quantity of water were used, the narcotine was left behind in the insoluble residue. The alkaloids existed in combination with a peculiar organic acid called meconic acid, and another acid had been discovered in opium which was isomeric with lactic acid. The liquid obtained by extraction with water was mixed with a certain quantity of chloride of calcium, and the precipitated meconate of lime separated, after which the solution was concentrated and allowed to stand, when hydrochlorate of morphine and hydrochlorate of codeine crystallized out; these bases could be easily separated by precipitation by ammonia, the codeine being soluble in water. It was generally supposed that the codeine formed a double salt with ammonia, but from Dr. Anderson's experiments this did not appear to be the case. The mother-liquor from which the hydrochlorates had been deposited gave, on the addition of ammonia, a precipitate containing narcotine, papaverine, thebaine, and codeine, together with numerous resinous matters; the presence of the last-mentioned base in the precipitate was remarkable on account of its solubility in water. On dissolving this precipitate in alcohol and crystallising, narcotine was deposited, the other bases remaining in solution; and Dr. Anderson imagined that this solution contained a base which had not as yet been noticed. The original mother-liquor from which the ammonia precipitate had been separated still contained bases, which might be extracted by agitating with ether. From the ethereal solution meconine could be obtained. The products of decomposition of narcotine under the action of reagents were very interesting. The composition of this alkaloid had been determined by different experimenters, and their results did not altogether agree; for the three formulæ,  $C_{44}H_{23}NO_{14}$ ,  $C_{40}H_{25}NO_{14}$ , and  $C_{48}H_{27}NO_{14}$ , had been given, which had been explained by the supposition that there existed three alkaloids agreeing very closely in their properties, and named methylo-, ethylo-, and propylo-narcotine, on account of the decomposition they underwent when passed over soda lime, the three yielding respectively

methyllamine, ethyllamine, and propyllamine. By the action of oxydising agents, narcotine might be separated into a basic substance called cotarnine,  $C_{24}H_{11}NO_6$ , and an indifferent body, which was meconine; three acids being produced at the same time,—namely, opianic acid,  $C_{20}H_{10}O_{10}$ , hemibanic acid,  $C_{20}H_{10}O_{12}$ , and a third acid body of the composition  $C_{20}H_{10}O_8$ . Cotarine when acted on by nitric acid, gave an acid containing  $C_{16}H_7NO_8$ , called apophyllic acid. This acid might be considered as compounded of methyllamine and an acid of the formula  $C_{14}H_4O_{10}$ , and, in fact, when boiled with potash, underwent decomposition, giving off methyllamine. On dissolving narcotine in dilute sulphuric acid, and exposing it in sealed tubes to a temperature of  $300^\circ$  F., crystals are seen to form, which contain meconine; coloring matter and a humic substance being formed at the same time, while the solution is found to contain cotarnine. When opianic acid is mixed with concentrated sulphuric acid, a purple liquid is produced, which on dilution furnishes a redish coloring matter which has the properties of alizarin. With regard to the composition of the various substances found in opium, some relation between the different bases might be discovered. Codeine was homologous with morphine, as far as the formula was concerned; but this relation was not borne out by the properties of the two bases, which were very different. The other bases also showed, in some cases, a relation in composition. Several of these alkaloids, when exposed to the action of nitric acid, gave rise to substitution products. The substitution product of codeine could only be prepared by employing a very dilute acid; if stronger acids were used, a resinous acid was obtained, which, when boiled with potash, gave rise to a volatile base. This last reaction was very common among the group of alkaloids. With regard to the variations in the relative proportions of the various bases contained in opium, that obtained from China contained a large amount of narcotine and very little morphine; while the opium from Egypt contained scarcely any meconic acid, its place being taken by sulphuric acid.

Mr. Foster said that from the experiments that he had made in conjunction with Dr. Matthiesson, it appeared that the composition of cotarnine was represented by the formula  $C_{24}H_{13}NO_6$ , so that cotarnine and meconine together exactly

made up narcotine. They had found that oxidation of meconine furnished an acid containing  $C_{20}H_{10}O_{10}$ . The action of sodium amalgam on narcotine furnished a basic substance, which appeared to be cotarnine. This reaction was interesting, because it was the reverse of the action of nitric acid, which also gave rise to cotarnine. They represented cotarnine by the rational formula  $\left[ \begin{smallmatrix} (C_{22}H_{10}O_6)'' \\ C_2H_3 \end{smallmatrix} \right] N$ , for the action of nitric acid on this body furnished an acid of the formula  $C_{22}H_{12}O_{10}$ , and on dissolving cotarnine in hydrochloric acid and heating, a decomposition ensued, chloride of methyl and a body of the formula  $C_{22}H_{13}NO_8$ , HCl being formed. From their experiments on the decomposition of narcotine by soda lime, it appeared that under these circumstance trimethylamine was formed, which had been mistaken for propylamine on account of its platinum salt containing the same per-centage of metal.

Dr. Redwood remarked that he entertained doubts as to the absence of meconic acid in a genuine sample of opium. He had invariably found it to be present in a great number of samples which had come under his notice.

Mr. Morson observed that meconic acid was always present in opium, unless it had been removed by lime or a similar agent.—*Chem. News, London, May 10, 1862, from Proc. Chem. Society.*

#### ON THE CALCINATION OF MAGNESIA AND THE MEANS OF TESTING ITS PURITY.

By M. AMÉDÉE VÉZ.

Calcination of magnesia is an operation so simple, that at first sight it is not easy to comprehend how it can be made the subject of fresh observations, or how it can, in any case, fail to succeed. It is, however, constantly made evident that this is not the case, and that commercial magnesia, without speaking of its impurities, which have lately been much insisted upon, is far from possessing the physical properties which ought to pertain to it; it is dense, granular, very slightly attackable by diluted acids, and is with difficulty held in suspension in water. No way of avoiding these defects has hitherto been known ex-

cept by preparing very small quantities at a time, and by stirring the carbonate with an iron spoon during calcination, as advised in the Codex. These plans cannot be adopted in wholesale manufacture, and there are now large *special factories* for the calcination of magnesia. A long time is necessarily taken up in calcining large quantities of carbonate, because the heat penetrates with difficulty to the centre of the mass, the periphery of which during the operation undergoes the action of a very high temperature; the heat, in fact, must be very great, for, in order to make as much use of the crucible as possible, the carbonate is heaped up, and thus forms an obstacle to the escape of the gases. With the help of my brother, M. L. Vée, civil engineer, I have succeeded in overcoming these difficulties, by constructing a furnace wherein the carbonate of magnesia, spread in a layer, not thicker than seven centimètres, is submitted to the action of the degree of heat strictly necessary to decompose it, I will briefly describe the principal features of the apparatus.

It consists of a furnace and two retorts. There is no peculiarity in the construction of the furnace. The retorts are of cast iron, in shape rectangular; their height is only 10 centimètres, their breadth 60, their depth 70. The opening, occupying the whole of one of their smaller sides, is shut by means of a cast iron slab, fitting in a groove, and held in place by collars. The retorts are placed one above another, opening on one of the sides of the furnace, which are perpendicular to that in which the furnace-door is situated.

The direct action of the fire is on the lower retort; the product of the combustion passes round the back of it to reach and heat its upper surface, and the lower part of the other retort, round which it also passes before escaping up the chimney. The result of this arrangement is, that the lower retort becomes red hot, and the bottom of the upper retort somewhat less so. The decomposition begins in the upper retort, and is finished in the lower.

The carbonate must not be directly introduced into the retorts; fearing, but, as experience has shown me, without reason, to let the iron come in contact with the magnesia, I decided upon employing earthen cases, notwithstanding their weight,

their fragility, and the length of time required to heat them, when it occurred to me to heat a fragment of sheet iron with magnesia, in a platinum crucible. I found that when not left too long in contact or at too high a temperature, the product was white, and not perceptibly more ferruginous than the carbonate which furnished it. So that I had sheet iron cases made in which to put the carbonate to be introduced into the retorts. The use of sheet iron is, however, not without its inconveniences; it becomes covered with a coat of oxide, which generally detaches itself in lamels, which require to be sifted from the magnesia. Occasionally this oxide is pulverulent, but it does not mingle with the mass if care is taken to leave a small layer of magnesia in the case to protect the rest in the following operations; the heat puts the cases out of shape, and thin sheet iron must be used, that there may be no difficulty in removing the cases in and out of the furnace. These defects are compensated by the lightness of the case, the little space it occupies, and the facility with which it is heated and cooled.

To produce complete decomposition the carbonate should remain 45 minutes in each retort. Thus, every three-quarters of an hour a case of magnesia is taken from the lower retort, and immediately replaced by a case of partially decomposed carbonate from the upper retort, into which a fresh case of carbonate is then introduced. The operation is continuous and the consumption of fuel small, because it is never necessary to cool the furnace.

Prepared in this way, magnesia is as light as is the hydrocarbonate. It combines easily with water, and dissolves immediately in diluted acids.

In the course of my analyses, I have had occasion to examine a great number of samples of magnesia, derived from various sources, and I have never yet found a single specimen of magnesia or carbonate completely free from lime, neither have I found one containing a sufficient quantity to offer any inconvenience. I cannot say that the admixture with a considerable quantity of lime can never be the case; but I think it would be quite exceptional, perhaps because attention has been called to this point by recent publications. In this analysis, I have always adopted the following plan, which I will briefly describe; for



though there is nothing absolutely new in it, yet this analytical method seems to me to give all the information necessary for appreciating any sample of magnesia by the aid of reagents to be found in every chemist's shop, without exacting any special skill like that required in an analysis by the bichloride of mercury. Weigh 1 gramme of magnesia, put it in a tared vessel, and dissolve it with a little diluted sulphuric acid; the solution should take place instantaneously, leaving no perceptible residuum. Then add 100 grammes of the solution to some water; shake it, and divide into two equal parts. With one portion mix 50 grammes of commercial spirits of wine, which precipitates the sulphate of lime; directly if there is much of it, in a few minutes if it exists in small proportion. Supersaturate the other half of the solution with ammonia; if the specimen contains any alumina this will be deposited colored by oxide of iron; this coloration often fails, but the flakes of alumina almost always assume a dark green color by the addition of a few drops of soluble sulphide.—*Chem. News, September 20, 1862, from Répertoire de Chimie pure et Appliquée.*

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#### A NEW USE FOR CARBOLIC ACID.

J. E. Ashby, LL.D., writes from Enfield to the *Mechanics' Magazine* as follows:—"Most persons have by this time heard that there is such a substance as carbolic acid; comparatively few have seen it, fewer still have used it, and no one (so far as I can find) has yet noticed a very remarkable property which it possesses in relation to practical mechanics. For the information of those to whom the substance itself is unknown, a word or two will be sufficient to introduce it to their notice. Carbolic acid is one of the products of the destructive distillation of coal, and till within a few years vast quantities of it were utterly wasted. When perfectly pure it is a white crystalline solid, which by absorbing water soon changes into a colorless refractive liquid, having a faint odor of roses and tar. It is not an acid in the popular sense, not being either sour or corrosive, and should therefore, perhaps, be generally designated by its other title of phenole. Crude carbolic acid may be obtained in bulk for a shilling per gallon, and is a dark tarry liquid, containing,

perhaps, from ten to twenty different substances, in a state of mechanical admixture. Fortunately, this crude acid is available for the purposes to which I invite the attention of your readers. Just as oil is an anti-frictional liquid, so is phenole pro-frictional: or, to state it more correctly, as oil appears to keep surfaces in motion asunder by interposing a thin film between them, so phenole appears to make them bite and bind, by bringing them into absolute contact (after a manner of speaking), and removing even the finest film from between them. Any one may convince himself of this by placing a little upon a perfectly clean and dry oil-stone, and then rubbing up the face of a broad chisel upon it. The sensation of the bite (I know no other word to express it) is very curious, and renders any further explanation unnecessary; it seems as if the stone and the steel had absolutely nothing between them, or even as if they were positively brought together by some attractive force. I have applied this property of carbolic acid to the following operations:—grinding, filing, boring, and sawing in metal, with great apparent advantage. When dissolved in fifteen parts by measure of methylated alcohol, it forms a milk-white emulsion if poured into water, and it may be worth while to ascertain whether such carbolated water would facilitate the ordinary work of the grindstone, a point on which I am not able to speak with certainty. If any of your readers should experience, as I did, much difficulty in obtaining the crude carbolic acid, I shall have much pleasure in indicating the source whence mine was derived, or in supplying any practical engineer with a small sample so long as my little quantity holds out.”—*Chem. News*, July 26, 1862.

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#### ON THE PREPARATION OF CAUSTIC SODA.

By M. WOHLER.

This process consists simply in calcining nitrate of soda with peroxide of manganese. No chameleon is formed, as might be supposed, since the nitrate decomposes long before the mixture can reach the temperature necessary for the production of man-ganic acid.—*Chem. News*, from *Annalen der Chemie und Pharmacie*.

## ON THE HISTORY OF PETROLEUM OR ROCK OIL.

By T. STERRY HUNT, M. A., F.R.S., of the Geological Survey of Canada.

Public attention has lately been drawn to the petroleum furnished by the oil wells in Canada and the United States, and we have, therefore, thought it well to bring together some few facts which may serve to explain the origin of this and of similar substances, including naphtha, petroleum, or rock oil, and asphalt, or mineral pitch, all of which are forms of bitumen, the one being solid, and the others fluid at ordinary temperatures. These differences are, in many cases at least, due to subsequent alterations; the more liquid of these substances are mixtures of oils differing in volatility, and by exposure to the air become less fluid, and partly by evaporation, partly by oxidation from the air, eventually become solid, and are changed into mineral pitch. These substances, which are, doubtless, of organic origin, occur in rocks of all ages, from the Lower Silurian to the tertiary period inclusive, and are generally found impregnating limestones, and, more rarely, sandstones, and shales. Their presence in the lower palæozoic rocks, which contain no traces of land plants, show that they have not been in all cases derived from terrestrial vegetation, but may have been formed from marine plants or animals: the latter is not surprising when we consider that a considerable portion of the tissues of the lower marine animals is destitute of nitrogen, and very similar in chemical composition to the woody fibre of plants. Besides the rocks which contain true bitumen, we have what are called bituminous shales, which when heated burn with flame, and by distillation at a high temperature yield, besides inflammable gases, a portion of oil not unlike in its characters to petroleum. These are, in fact, argillaceous rocks intermixed with a portion of organic matter allied to peat or lignite, which by heat is decomposed, and gives rise to oily hydrocarbons. These inflammable or lignitic shales, which may be conveniently distinguished by the name of *Pyroschists* (the *brandeschiefer* of the Germans,) are to be carefully distinguished from rocks containing ready-formed bitumen; this being easily soluble in benzole or sulphuret of carbon, can be readily dissolved from the rocks in which it

occurs, while the pyroschists in question yield, like coal and lignite, little or nothing to these liquids.

It is the more necessary to insist upon the distinction between lignitic and bituminous rocks, inasmuch as some have been disposed to regard the former as the source of the bitumen found in Nature, which they conceive to have originated from a slow distillation of these matters. The result of a careful examination of the question has, however, led us to the conclusion that the formation of the one excludes more or less completely that of the other, and that bitumen has been generated under conditions different from those which have transformed organic matters into coal and lignite, and probably in deep water deposits from which atmospheric oxygen was excluded. Thus, in the palæozoic strata of North America we find in the Utica and Hamilton formations highly inflammable pyroschists which contain no soluble bitumen, and the same is true to a certain extent of some limestones; while the Trenton and Corniferous limestones of the same series are impregnated with petroleum or mineral pitch, and, as we shall show, give rise to petroleum springs. The fact that intermediate porous strata of similar mineral characters are destitute of bitumen, shows that this material cannot have been derived from overlying or underlying beds, but has been generated by the transformation of organic matters in the strata in which it is met with. This conclusion is in accordance with that arrived at by Mr. S. P. Wall in his recent investigations in Trinidad. He has shown that the asphalt of that island and of Venezuela belongs to strata of the tertiary formation (of upper miocene or lower pliocene age,) which consists of limestones, sandstones, and shales, associated with beds of lignite. The bitumen is found not only in the famous pitch lake, but *in situ* where it is confined to particular strata which were originally shales, containing vegetable remains. These have undergone "a special mineralization, producing a bituminous matter instead of coal or lignite. This operation is not attributable to heat, nor of the nature of a distillation, but is due to chemical reactions at the ordinary temperature, and under the normal conditions of climate." He also describes wood partially converted into bitumen, which last, when removed by solution, leaves a portion of woody tissue. (Proc. Geol. Soc. London, May, 1860.)

The sources of petroleum and mineral pitch in Europe and in Asia are for the most part, like those just named, confined to rocks of newer secondary and tertiary age, though they are not wanting in the palæozoic strata, which in Canada and the United States furnish such abundant supplies of petroleum. In the great palæozoic basin of North America, bitumen, either in a liquid or solid state, is found in the strata at several different horizons. The forms in which it now occurs depend in great measure upon the presence or absence of atmospheric oxygen, since by oxidation and volatilisation the naphtha or petroleum, as we have already explained, becomes slowly changed into asphalt or mineral pitch, which is solid at ordinary temperature. It would even appear that by a continuance of the same action the bitumen may lose its fusibility and solubility, and become converted into a coal-like matter. Thus, in the calciferous sand-rock in New York a black substance, which has been called anthracite, occurs in cavities with crystals of bitter spar and quartz. It sometimes coats these crystals or the walls of the cavities, and at other times appears in the form of buttons or drops, evidently, according to Mr. Vanuxem, having been introduced into these cavities in a liquid state, and subsequently hardened as a layer above the crystals which have conformed to them, showing that this coal-like matter was once in a plastic state. It is very pulverulent, brittle, of a shining black, and according to Vanuxem, yielded but little ash and 11½ per cent. of volatile matter, which he regarded as water (Vanuxem, *Geology of New York*, iii. 88.) A similar material occurs in the Quebec group in Canada, the equivalent of the calciferous sandrock, and fills cavities and fissures in the limestones, sandstones, and even in the accompanying trap rocks, as at Quebec, Orleans Island, Point Levis, and at Acton, presenting mamillary surfaces, as noticed by Vanuxem, which evidently show that it has once been semi-fluid. This matter from the first two localities is completely infusible, and insoluble in benzol; it readily crumbles between the fingers, and gives a very black powder. When exposed to a high temperature it gives off abundance of inflammable strong-smelling vapors, which condense into a tarry oil, and leave a black residue, which when heated slowly burns away, leaving only a trace of ash. The volatile

portion is equal to from 19.5 to 21.0 per cent. The mineral from the Acton copper mine is much harder and less friable, and approaches to anthracite in its characters. When heated it gives off watery vapor without any bituminous odor. Its loss by heat was 6.0 per cent., and the residue of ash was equal to 2.2 per cent.

An evidence of the presence of the unaltered petroleum in almost all the Lower Silurian limestones is furnished by the bituminous odor which they generally exhibit when heated, struck, or dissolved in acids. In some cases petroleum is found filling cavities in these limestones, as at Rivière à la Rose (Montmorenci,) where it flows in drops from a fossil coral of the birdseye limestone; and at Pakenham, where it fills the cavities of large orthoceratites in the Trenton. From some specimens nearly a pint of petroleum has been obtained. It is also said to occur in the township of Lancaster in the same formation. The presence of petroleum in the Lower Silurian rocks of New York is shown in the township of Guelderland, near Albany, where, according to Beck, considerable quantities of petroleum are collected upon the surface of a spring which rises through the Hudson River or Loraine shales. On the great Manitoulin Island, also, according to Mr. Murray, a petroleum spring issues from the Utica State, and he has described another at Albion Mills, near Hamilton, rising through the red shales of the Medina group; these have probably their origin in the Lower Silurian limestones, which may in some localities prove to be valuable sources of petroleum.

In the Upper Silurian and Devonian rocks bitumen is much more abundant. Eaton long since described petroleum as exuding from the Niagara limestone, and this formation throughout Monroe County, in western New York, is described by Mr. Hall as a granular crystalline dolomite, including small laminae of bitumen, which gives it a resinous lustre. When the stone is burned for lime the bitumen is sometimes so abundant as to flow like tar from the kiln. In the Corniferous limestone, at Black Rock, on the Niagara River, petroleum is described as occurring in cavities, generally in the cells of fossil corals, from which, when broken, it flows in considerable quantities. It also occurs in similar conditions in the Cliff limestone (Devonian) of Ohio.

Higher still in the series, at the base of the Hamilton group, occur what in New York have been called the Marcellus shales; these enclose septaria or concretionary nodules, which contain petroleum, while at the summit of the same group similar concretions, holding petroleum, are again met with. The sandstones of the Portage and Chemung group, in New York, are in many places highly bituminous to the smell, and often contain cavities filled with petroleum, and in some places seams of indurated bitumen. A calcareous sandstone from this formation, at Laona, near Fredonia, in Chataouque County, contains more than two per cent. of bituminous matter. At Rockville, in Alleghany County, according to Mr. Hall, the same sandstones are highly bituminous, and give out a strong odor when handled, and in the counties of Erie, Seneca, and Cataraugus, abundant oil springs rise from the sandstones, and have been known to the Seneca Indians from ancient times. In the northern part of Ohio, according to Dr. Newberry, petroleum is found to exude, in greater or less quantity, from these sandstones wherever they are exposed, and the oil wells of Pennsylvania and Ohio are sunk in these Devonian sandstones, often through the overlying carboniferous conglomerate, and in some cases apparently, according to Newberry, through the sandstones themselves, which are supposed by him to be only reservoirs in which the oil accumulates as it rises through fissures from a deeper source, in proof of which he mentions that, in boring wells near to each other, the most abundant flow of oil is met with at variable depths. In some instances the petroleum appears to filter slowly into the wells from the porous strata around, which are saturated with it, while at other times the bore seems to strike upon a fissure communicating with a reservoir which furnishes at once great volumes of oil. An interesting fact is mentioned in this connection by Mr. Hall. In the town of Freedom, Cataraugus County, New York, is a spring which had long been known to furnish considerable quantities of petroleum. On making an excavation about six yards distant, to the depth of fourteen feet, a copious spring of petroleum arose, and for some time afforded large quantities of oil, after which the supply diminished in both the old and new springs, so that it is now less than at the first settlement of the country. Notwithstanding its general distri-

bution throughout a considerable region in the adjacent portions of New York, Pennsylvania, and Ohio, it is only in a few districts that it has been found in quantities sufficient to be wrought with profit. The wells of Mecca in Trumbull County, Ohio, have been sunk from 30 to 200 feet in a sandstone which is saturated with oil; of 200 wells which have been bored, according to Dr. Newberry, a dozen or more are successfully wrought, and yield from five to twenty barrels a-day. The wells of Titusville, on Oil Creek, Pennsylvania, vary in depth from 70 to 300 feet, and the petroleum is met with throughout. The oil from different localities varies considerably in color and thickness, and in its specific gravity, which ranges from  $28^{\circ}$  to  $40^{\circ}$  B. (from .890 to .830.)

The Valley of the Little Kenawha, in Virginia, which is to be looked upon as an extension of the same oil-bearing region, contains petroleum springs, which, so long as 1836, according to Dr. Hildreth, yielded from fifty to a hundred barrels yearly. It here rises through the carboniferous strata, and, as elsewhere, is accompanied by great quantities of inflammable gas.

The black inflammable shales of the Devonian series in Western Canada, which were formerly referred to the Hamilton group, and are now considered to belong to the base of the overlying Portage and Chemung, appear at Kettle Point, on Lake Huron, and in portions of the region southward to Lake Erie; but the oil wells sunk in Enniskillen show that the source of the oil is really below the horizon of these shales, inasmuch as the underlying argillaceous shales and limestones of the Hamilton group are there found near the surface, and have been penetrated 120 feet, at which depth oil is still met with, leaving but little doubt that it is derived from the limestones beneath, which, both in New York and in Canada, are impregnated with petroleum. A somewhat slaty, brownish-black, bituminous dolomite, belonging to the Carboniferous limestone from Pine Creek, near Alma, in Kincardine, gave me not less than 12.8 per cent. of bitumen, fusible and readily soluble in benzole, and another from the Grand Manitoulin Island, which was a brown, crystalline dolomite, yielded from 7.4 to 8.8 per cent. of similar bitumen. The solid form of this bitumen at the outcrop of the rocks is probably due to the action of the air.



The existence of liquid bitumen in the Corniferous limestone in Western Canada was pointed out as long ago as 1844 by Mr. Murray, who tells us that this rock is generally bituminous, and that cavities in it are often filled with petroleum; the quarries near Gravelly Bay, in Wainfleet, are cited as an example (Report of Geol. Survey, 1846, p. 87.) In the report of 1850 we find a notice of what are called oil springs, in which petroleum rises to the surface of the water near the right bank of the Thames, in Mosa, and in two places in Bear Creek, in Enniskillen. Subsequently Mr. Murray described a considerable deposit of solid bitumen or mineral tar, which occurs in the same township, extending over about half an acre, and in some places two feet in thickness, doubtless formed by the drying up of petroleum springs (Report for 1851, p. 90.) I had already, in the Report for 1849, p. 99, described this bitumen from specimens in the Museum of the Geological Survey, and called attention to its economic applications, remarking that "the consumption of this material in England and on the Continent for the construction of pavements, for paying the bottom of ships, and for the manufacture of illuminating gas, is such that the existence of these deposits in the country is a matter of considerable importance." At this time solid bitumen was thus employed, but in the liquid form of petroleum its use was chiefly confined in Europe to medicinal purposes. Under the names of Seneca oil and Barbadoes tar it had long been known and employed medicinally by the native tribes of America. Its use for burning, as a source of light or heat, in modern times has been chiefly confined to Persia and other parts of Asia, although in former ages the wells of the island of Zante, described by Herodotus, furnished large quantities of it to the Grecian Archipelago, and Pliny and Dioscorides describe the petroleum of Agrigentum, in Sicily, which was used in lamps under the name of Sicilian oil. The value of the naphtha annually obtained from the springs at Bakoum, in Persia, on the Caspian sea, was some years ago estimated by Abich at about 600,000 dollars, and the petroleum wells of Rangoon, in Burmah, are said to furnish not less than 400,000 hogsheads yearly. In the last century the petroleum or naphtha obtained from springs in the Duchy of Parma was employed for lighting the

streets of Genoa and Amiano; but the thickness, coarseness, and unpleasant odor of the petroleum from most sources were such that it had long fallen into disuse in Europe, when in 1847 the attention of Mr. Young, a manufacturing chemist of Glasgow, was called to the petroleum which had been thus obtained in considerable quantities from a coal mine at Riddings, in Derbyshire, from which, by certain refining processes, he succeeded in preparing a good lubricating oil. This source, however, soon becoming exhausted, he turned his attention to the somewhat similar oils which Reichenbach and Selligie had long before showed might be economically obtained by the distillation of coal, lignite, peat, and pyroschists. To this new industry Mr. Young gave a great impetus, and in connection with it attention was again turned to the refining of liquid and solid bitumens, it being found that the latter by distillation gave great quantities of oil identical with those from petroleum. About the year 1853 the attention of speculators was turned to the deposits of bitumen in Enniskillen just described, but it was not till 1857 that Mr. W. M. Williams, of Hamilton, with some associates, undertook the distillation of this tarry bitumen, when they soon found that by sinking wells in the clay beneath it was possible to obtain great quantities of the material in a fluid state. Large numbers of wells were subsequently sunk by Mr. Williams and others in the southern part of the township of Enniskillen, along the borders of the Black Creek, and also about ten miles farther north on Bear Creek. Nearly 100 wells had been sunk when I visited the place in December last, and many more have since been bored. Of these but a small proportion furnish available quantities of oil, but the whole amount already obtained from the district is perhaps not less than 300,000 or 400,000 gallons. Owing to the difficulties of communication and of procuring casks sufficient for the oil, these wells have not been wrought in a continuous manner. Large quantities of oil are, however, taken out at intervals of some days, and it is probable that, if continuously worked, the supply would be still greater. Here, as in Pennsylvania, considerable variations are found in the quality of the oil. That from the wells on Black Creek is more liquid and less dense than the oil from Kelly's wells on Bear Creek, and it is said that wells recently sunk to a

considerable depth in the rock have yielded an oil still thinner, lighter colored, and less dense, which is prized as being more profitable for refining. The present wholesale price of the crude oil from Kelly's wells, delivered at Wyoming station on the Grand Trunk Railway, is about thirteen cents a gallon. The oil obtained by Mr. Williams is refined in Hamilton, while that from the northern part of the township has hitherto been sent to Boston, though refining works are now being erected at the wells. The process of refining consists in rectifying by repeated distillations, by which the oil is separated into a heavier part employed for lubricating machinery, and a lighter oil, which, after being purified and deodorised by a peculiar treatment with sulphuric acid, is fit for burning in lamps.

These wells occur along the line of a low, broad anticlinal axis, which runs nearly east and west through the Western Peninsula of Canada, and brings to the surface in Enniskillen the shales and limestones of the Hamilton group, which are there covered with a few feet of clay. The oil doubtless rises from the Corniferous limestone, which, as we have seen, contains petroleum. This being lighter than the water which permeates at the same time the porous strata, rises to the higher portion of the formation, which is the crest of the anticlinal axis, where the petroleum of a considerable area accumulates, and slowly finds its way to the surface through vertical fissures in the overlying Hamilton shales, giving rise to the oil springs of the region. The oil is met with at various depths. In some cases an abundant supply is obtained at forty feet, while near by it is only met with at three or four times that depth, and sometimes only in small quantities. Everything points to the existence of separate fissures communicating with a deep-seated source. At Kelly's wells, however, it would appear that a reservoir has been formed much nearer the surface, where in a bed of gravel and boulders, underlying the superficial clays, the oil rising from the rocks beneath has accumulated. The inflammable gas which issues from the wells is not necessarily connected with the petroleum, inasmuch as it is an almost constant product of the decomposition of organic matters, and is copiously evolved from rocks which are destitute of bitumen. It is similar to the gas of marshes and to the fire-damp of coal

mines. A curious circumstance is, however, noticed by Mr. Robb; the gas which accumulates in the oil pits becomes charged with vapors which produces upon the workmen a sort of intoxication like nitrous oxide. This is not surprising when we remember that volatile hydrocarbons, like amylene, closely related to the hydrocarbons of petroleum, produce similar effects when their vapor is respired.

The oil wells of the United States are for the most part sunk in the sandstones which form the summit of the Devonian series; but the oils of Western Virginia and Southern Ohio rise through the coal measures which overlie the Devonian strata, while the wells of Enniskillen are situated much lower, and are sunk in the Hamilton shales, which immediately overlie the Corniferous or Devonian limestone. It is not impossible that in Ohio some of the higher strata, such as the sandstone, were originally impregnated with bitumen, but in Canada, from the absence of this substance diffused through the shales in question, we are forced to assign it to a lower horizon, which is doubtless that of the bituminous Devonian limestone. This view I have for some time maintained in opposition to those who conceive the bitumen to be derived from the black pyroschists; (see my lecture before the Board of Arts reported in the *Montreal Gazette* of March 1, where I asserted that the source of the petroleum was to be sought in the bituminous Devonian and Silurian limestones;) besides the Corniferous limestone (Devonian,) we have shown that both the Niagara and the Trenton (of Upper and Lower Silurian age) contain petroleum. The question of the extent of the supply of petroleum is not easily answered; the oil now being wrought is the accumulated drainings of ages, concentrated along certain lines of elevation, and the experience of other regions has shown that these sources are sooner or later exhausted; but though the springs of Agrigentum, like those of Derbyshire, have nearly ceased to flow, those of Burmah and Persia still furnish, as they have for ages past, immense quantities of oil, nothing but experience can tell us the richness of the subterranean reservoirs. It is not probable that the Devonian limestone is equally rich in petroleum throughout its whole distribution, but the exposures of it in the west are too few to enable us as yet to say in what portions the petroleum predomi-

nates; as, however, this rock underlies more than one-half of the Western Peninsula, we may look for the petroleum springs much further east than Enniskillen. A well yielding considerable quantities of petroleum is said to occur in the township of Dereham, about a quarter of a mile southwest of Tilsonburg, and we may reasonably expect to find others along the line of the anticlinal, or of the folds which are subordinate to it.

It is now many years since Sir William Logan described the occurrence of petroleum springs in Gaspé, and collected specimens of the oil, which are preserved in the Geological Museum. One of these, near Gaspé Bay, is described as occurring on the south side of the St. John's River, about a mile and a-half above Douglas Town, where it may be collected by digging pits in the mud on the beach. Another locality is about 200 yards up a small fork of the Silver Brook, which falls into the south-west arm six or seven miles above Gaspé Basin. The oil collects in pools along the stream, and may be gathered in considerable quantities. The cavities in a greenstone dyke on Gaspé Bay were also found to be filled with petroleum, and the odor of it from the rock was perceived at a considerable distance. The dyke, which marks a fold in the stratification, runs in the direction of the petroleum springs, and the evidences of the distribution of petroleum are thus, as Sir William Logan has remarked, visible along a line of twenty miles (Report for 1844, p. 41.) Attention has recently been drawn to these indications, and a company formed with a view of exploring this region for petroleum. Here, as well as in Western Canada and the United States, the connection is evident between the springs and undulations of the strata which favor the accumulation of the petroleum.

We have stated in the preceding paper that the different mineral combustibles have been derived from the transformations of vegetable matters, or in some cases of animal tissues analogous to these in composition. The composition of woody fibre or cellulose, in its purest state, may be represented by  $C_{24}H_{20}O_{20}$ , or as a compound of the elements of water with carbon; the incrusting matter of vegetable cells, to which the name of lignin has been given, contains, however, a less proportion of

oxygen, and more carbon and hydrogen than cellulose, so that the mean composition of recent woods, as deduced from numerous analyses of various kinds, may be represented by  $C_{24}H_{18.4}O_{16.4}$ . We may conceive of four different modes of transformation of woody fibre, all of which probably intervene to a greater or less degree in the production of mineral combustibles; and in considering these changes we shall for greater simplicity adopt for the composition of woody fibre, the first named formula,  $C_{24}H_{20}O_{20}$ .

I. When wood is exposed to the action of moist air, oxygen is absorbed, and carbonic acid and water are evolved in the proportion of one equivalent of the first for two of the last.

We may suppose that for  $H_2$  which is oxidised by  $O_2$  from the air, the wood loses  $CO_2$ , so while the carbon increases in amount the proportions of oxygen and hydrogen are unchanged. In this way an equivalent of cellulose, by absorbing sixteen equivalents of oxygen, and losing eight of carbonic acid ( $8CO_2$ ) and sixteen of water ( $16HO$ ), would leave  $C_{16}H_4O_4$ . Such is the nature of the decay of wood when exposed to the air, and the process, could it be carried out, would leave a residue of carbon only. If, however, the wood is deeply buried and excluded from the oxygen of the air, two reactions are conceivable.

II. The whole of the oxygen of the wood may be given off in the form of carbonic acid, while the hydrogen remains with the residual carbon. The abstraction of ten equivalents of carbonic acid from one of woody fibre would leave a hydrocarbon  $C_{14}H_{20}$ .

III. Instead of combining exclusively with the carbon, a part of the oxygen of the wood may be set free as water, in combination of the hydrogen. The abstraction from an equivalent of woody fibre of four equivalents of carbonic acid and twelve of water would leave a hydrocarbon  $C_{20}H_8$ .

IV. These decompositions are, however, never so simple as we have supposed in II. and III., for a portion of hydrogen is at the same time evolved in combination with carbon, chiefly as marsh-gas,  $C_2H_4$ . The amount of this gas evolved from decaying plants submerged in water, and the immense quantities of it condensed in coal-beds and other rocky strata (forming fire-damp,) show the great extent to which this mode of decomposition prevails.

In nature these various modes of decomposition often go on together, or intervene at different stages in the decomposition of the same mass; they are, besides, seldom so complete as we have represented them. The first process results in the formation of vegetable mould, which always retains portions of carbon and hydrogen; while the incomplete operation of the processes II., III. and IV. give rise, to peat, lignite, brown coal, bituminous coal, and pyroschists, in all of which the proportion of the oxygen is much less than the hydrogen, so that their composition may be approximately represented by mixtures of hydrocarbons with vegetable fibre. The following results have been selected from a great number of analyses by various chemists, and are for the most part taken from Bischof's "Chemical Geology" (vol. i. cap. xv.) The nitrogen, which in most cases was included in the oxygen with the analysis, has been disregarded, and the oxygen and hydrogen, for the sake of comparison, have been calculated for twenty-four equivalents of carbon:—

1. Vegetable fibre or cellulose	. . .	$C_{24}H_{20}O_{20}$
2. Wood, mean composition	. . .	$C_{24}H_{18.4}O_{16.4}$
3. Peat (Vaux)	. . .	$C_{24}H_{14.4}O_{10}$
4. Ditto (Regnault)	. . .	$C_{24}H_{14.4}O_{9.6}$
5. Brown coal (Schrötter)	. . .	$C_{24}H_{14.8}O_{10.6}$
6. Ditto do. (Woskresensky)	. . .	$C_{24}H_{18}O_{7.6}$
7. Lignite (Vaux)	. . .	$C_{24}H_{11.8}O_{6.4}$
8. Do., passing into mineral resin (Regnault)	. . .	$C_{74}H_{15}O_{3.8}$
9. Bituminous coal	. . ditto	$C_{24}H_{10}O_{3.8}$
10. Ditto do.	. . ditto	$C_{24}H_{10}O_{1.7}$
11. Ditto do.	. . ditto	$C_{24}H_{8.4}O_{1.2}$
12. Ditto do.	. . ditto	$C_{24}H_8O_{0.9}$
13. Ditto do. (Kühnert and Gräger)	. . .	$C_{24}H_{7.4}O_{1.3}$
14. Ditto do. (mean comp.) (Johnston)	. . .	$C_{24}H_9O_2-O_4$
15. Albert coal (Wetherell)	. . .	$C_{24}H_{15.9}O_{1.6}$
16. Asphalt, Auvergne	. . .	$C_{24}H_{17.7}O_{2.2}$
17. Ditto, Naples.	. . .	$C_{24}H_{14.6}O_2$
18. Ditto, Bastennes	. . .	$C_{24}H_{16}O_{0.7}$
19. Elastic bitumen, Derbyshire (Johnston)	. . .	$C_{24}H_{22}O_{0.8}$
20. Bitumen of Idria	. . .	$C_{24}H_8$
21. Petroleum and naphtha	. . .	$C_{24}H_{24}$

In the above table we see the transition from peat and brown coal to lignite, and thence to bituminous coal. Professor Johnston, from his experiments on various coals, including cannel from Wigan, splint coal from Workington, and caking coal from Newcastle, deduced the composition given in 14, in which with  $C_{24}H_6$ , the oxygen varies from two to four equivalents. It will be seen from a comparison of the infusible Albert coal with the bitumens 16, 17, and 18, how gradual is the transition to the true petroleum and naphtha, from which oxygen is absent. The asphalts also, as will be observed, differ very much in their composition, and though generally much richer in hydrogen than the bituminous coals, the variety from Naples (17) which is completely fusible at  $140^{\circ}C.$ , contains less hydrogen and more oxygen than the Albert coal analysed by Wetherell; while the idrialine or bitumen found with the mercury ores of Idria, approaches very nearly in composition to the bituminous coals, 11, 12, and 13, with which many asphalts may be said to be isomeric. It is, however, probable that those oxygenised bitumens, unlike the coals, are products of the oxidation of naphtha or petroleum, by a process similar to that by which resins are derived from vegetable hydrocarbons. These formulæ must be taken as representing not the true equivalents, but only the proportions of the elements in the bodies in question, which are in most cases mixtures of various substances. This is especially true of naphtha, which may be taken as the representative of pure unoxidised petroleum, and which is separated by distillation into oils of very different boiling points. The late analyses by Uelsmann of the rectified rock oil from Sehnde, near Hanover, gave the formula  $C_{18}H_{20}$  and, according to De la Rue and Müller, the greater part of the Rangoon petroleum consists of hydrocarbons, in which the number of equivalents of hydrogen is a little greater than the carbon; one gave  $C_{26}H_{28}$ . Associated with these are, however, portions of bodies containing a less proportion of hydrogen, so that we may conceive the mean composition of petroleum to be represented, as in the preceding table, by equal equivalents of hydrogen and carbon; many forms of solid bitumen also, as ozokerite and hatchetine, have the same general composition.

By referring to what has been said above, it will be seen that



the final result of the third process of decomposition of woody fibre, in which the air being excluded the oxygen is shared between the carbon and hydrogen, would be  $C_{20}H_8$ . A similar result would be obtained with the simultaneous evolution of marsh-gas, if we suppose  $6 CO_2 + 8HO + 3CH_2$  to be removed from an equivalent of woody fibre, leaving  $C_{15}H_8 = C_{20}H_8 = C_{24}H_{9.5}$ , which approaches the composition of most bituminous coals and of idrialine. A further elimination of marsh-gas would leave a residue of pure carbon, and thus, as Bischof has suggested, vegetable matters may be converted into anthracite without the intervention of a high temperature.

The elimination of the whole of the oxygen in the form of carbonic acid would leave a compound with a large excess of hydrogen, of which it would be necessary to remove a portion in the form of water or marsh-gas, in order to reduce the residue to the composition of petroleum. We know of no combination of carbon and hydrogen in which the number of atoms of hydrogen surpasses by more than two, those of hydrogen, the general formula being  $C_nH_{n+2}$ , so that oils like  $C_{18}H_{20}$  and  $C_{26}H_{28}$  contain nearly the maximum quantity of hydrogen, and a body like  $C_{14}H_{20}$ , whose formation we have supposed above, could not exist, but must break up into marsh-gas and some less hydrogenous oil like petroleum.

We do not know the precise conditions which in certain strata favor the production of petroleum rather than of lignite or coal; but in the fermentation of sugar, to which we may compare the transformations of woody fibre, we find that under different conditions it may yield either alcohol and carbonic acid, or butyric and carbonic acids with hydrogen, and even in certain modified fermentations the acetic, lactic, and propionic acids, and the higher alcohols, like  $C_{10}H_{12}O_2$ . These analogies furnish suggestions which may lead to a satisfactory explanation of the peculiar transformation by which, in certain sedimentary strata, organic matters have been converted into bitumen.—*Chem. News, July 5th, 12th and 19th, from the Canadian Naturalist.*

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#### PRODUCTION OF CORK.

In the "Mémoires de la Société de Physique" of Geneva, is an interesting paper by M. Casimir de Candolle on the growth

of cork. Although this useful substance exists in varying quantity in the bark of all phanerogamous plants and in several cryptogamous, yet for commercial purposes it is wholly procured from two species of oak, *Quercus occidentalis*, growing in the south-west of France and in Portugal, and from *Quercus Suber* (the cork-tree,) growing in the south-east of France, in Italy, in Algeria, and in the isles of the Mediterranean. The acorns of the former species take two years to ripen. In 1859 M. C. de Candolle, while staying in Algeria, studied the development of the bark of the latter species. It is composed of four layers—the epidermis, the corky envelope, the cellular envelope, and the liber which covers the soft wood. These four parts increase independently of each other year by year. In the third or fourth year the epidermis, having attained the limits of its elasticity, splits longitudinally, and a marked change takes place in the corky envelope, which gradually takes up the appearance of true cork: new layers are produced, and the transformation of cellulose into cork steadily goes on. The cork thus naturally developed has no commercial value. It is termed “male;” and the first act (*démascelage*) of the cultivator is to separate it from the trunk, which thus leaves exposed the liber, termed “mother.” The tree is then left to itself, and the cork begins to grow again, whilst the sap is flowing in consequence of the exposure of the liber. If a trunk left in this state for several months be cut down, in the section a ring of cork will be found formed in the interior of the “mother,” at a variable distance from the surface of the trunk. All the exterior portion of the “mother” is dead, and splits as the tree grows, and the interior portion (new cork, termed “female”) is developed. This “female” cork grows in the same manner as the “male,” that is, by the addition of annual layers on the internal surface; but it is much finer and more elastic, and is the cork of commerce. These various stages of growth are exhibited in a series of beautiful plates. In the course of his researches M. de Candolle was led to observe the importance of the desiccation of the “mother,” and to infer that, in proportion as this desiccation could be hastened, so much sooner would fresh layers of cork be produced. This idea he found to be correct. He observed several trees in which

fires, after having charred the male or female cork, had determined the formation of a layer of female cork in the interior of the "mother." He states that he has seen a specimen, composed of three layers of "female" cork, separated by little zones from the "mother;" the fourth layer, which enveloped the whole, having disappeared in consequence of the fire. The thickness of these zones, increased by the application of boiling water, does not diminish by cooling. Other peculiarities of this remarkable substance are noted in the memoir.—*The Chemist and Druggist*, August 15, 1862.

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#### ON NATIVE ZINC AND NATIVE TIN.

By DR. T. L. PHIPSON, F.C.S., &c.

Having been requested to give a description of the Australian minerals exhibited by the various Australian Colonies in the International Exhibition, I was surprised to find in this magnificent collection a specimen of native zinc. This is the first time that this metal has been met with in nature in the pure state. The specimen, weighing perhaps ten or twelve grains, is incrustated in a piece of basalt, from Brunswick, near Melbourne, Victoria.

Concerning native tin, it is evidently very rare in nature. Some years ago, I noticed some small white grains in a sample of platinum ore from the Ural, which appeared to be metallic tin. Hermann had already met with this metal, in small white grains, in the gold deposits of Siberia, and, recently, M. Damour found it accompanying some gold nuggets from Guyana. These nuggets contained nearly 42 per cent. of platinum, also silver and copper. One of them was observed to have adhering to its surface, and in some of its cavities, a grayish-white ductile metal which was proved to be metallic tin.

The above leads me to infer that the supposed new element noticed in the platinum ore of Rogue River, Oregon, by Mr. Chandler, and in the platinum ore of California, by Dr. Genth, as stated in a recent number of the *Chemical News*, is simply metallic tin. The more so, as these authors state that the metal in question is malleable, easily fusible, soluble in hydrochloric acid, from which solution it is precipitated as a brown sulphide

by sulphuretted hydrogen, or by zinc as a metal resembling metallic tin.—*Chem. News, London, July 26, 1862.*

## ON A METHOD OF PREPARING CERTAIN PHARMACEUTICAL EXTRACTS.

BY M. PIERLOT.

M. Pierlot's process is especially valuable in preparing extracts of aromatic plants, their useful principles being necessarily dissipated during the preparation of extracts by the ordinary method. It might pass for an ingenious application of M. Millon's researches on the subject of vegetable perfumes if the author, who does not quote M. Millon, did not appear to be unaware of his work.

Into a displacement apparatus, a fresh plant, such as absinthe, tansy, milfoil, chamomile, primrose root, valerian root, &c., is introduced, and covered with ether, which gradually expels the water of vegetation, and retains the volatile aromatic principles of the plant. The displaced water occupies the lower part of the funnel, holding in solution the extractive matter, the albumen, and several saline principles. In proportion as it is drawn off, the water is replaced by fresh quantities of ether, and as soon as the ether ceases to displace water the plant is put under the press, and treated again by ether.

The different quantities of ether which have been used are now to be mixed, and distilled in a water bath at 30°. This distillation produces ether, with hardly any impregnation, and a residuary (formed of an essential oil, of a bluish color, and a greenish-yellow, resinous, fatty matter) containing all the perfume of the plant.

The displaced water contains the extractive matter and the albumen. By shaking up with a little alcoholised ether, the coagulated albumen rises to the surface, and is separated by filtration. The extractive matter is obtained by evaporation.

The union of these two residuums gives an odorous extract, representing very exactly all the active elements of the plant. Pharmacutists who attach an exaggerated amount of importance to the appearance of their medicaments can object to it only on account of its forming with water turbid solutions.

M. Pierlot says that all the fresh flowers and roots he has treated in this way have yielded almost identical quantities of extract,—about ten per cent., two parts of aromatic principles, and eight parts of extractive. He adds:—"It is useless to enlarge on the therapeutical and pharmaceutical advantages of this method of preparing extracts of aromatic plants. I will only remark that, from a pharmaceutical point of view, the process forms the commencement of analysis,—that is to say, the estimation of these medicaments. The word 'commencement' is a necessary correction; for now-a-days it is not sufficient in analysing a plant to determine the amount of extract it will yield."—*Chem. News*, July 16, 1862, from *Bulletin de Thérapeutique*, vol. lxi. p. 409.

#### MINOR NOTES ON THE MATERIA MEDICA OF THE INTERNATIONAL EXHIBITION.

BY DANIEL HANBURY, F. R. S.

**CONTRAYERVA ROOT.**—It has long been known to pharmacologists that this drug, as found in the shops, is not derived from *Dorstenia Contrajerva*, Linn., but that it is usually the root of another species, *D. Brasiliensis* Lam. The Exhibition, however, contains two specimens of contrayerva root which are ascribed, and, I have no doubt, correctly, to *D. Contrajerva*. One of them has been forwarded by M. Bélanger, of the Botanical Garden of St. Peirre, Martinique, the other by Mr. Devenish, of Trinidad. Dr. Crüger, the Colonial Botanist of Trinidad, states that the drug is in great repute among the Spaniards of the island as an alexiteric. Contrayerva root has become nearly obsolete in European medical practice, and, indeed, almost of necessity, for it is very scarce, and the little that can be found is usually old and worm-eaten. Were it necessary to re-introduce it, supplies could be obtained from Trinidad, in certain localities of which island, I am informed by Dr. Crüger, *D. Contrajerva* is abundant.

**PODS OF MYROSPERMUM.**—The Trinidad collection of drugs contains a good specimen of the entire legumes of *Myrosporum frutescens* Jacq., a tree known in the island by the name of *Guatamare*. These legumes are a very popular stomachic

and carminative, and are also used externally in the form of tincture, for pains, etc. The tree which in Trinidad attains an altitude of sixty to one hundred feet (and hence bears a very improper specific name,) yields from incisions in its stem a small amount of balsamic resin which hardens in the air and is then undistinguishable from Balsam of Tolu. None of this resin is collected in Trinidad, where the tree is not very abundant and apparently not indigenous. Young plants of *M. frutescens*, raised from seeds sent by Dr. Crüger, may be seen in the Royal Gardens of Kew.

Pods of *Myrospermum*, having the posterior or winged portion broken off, are also sent to the Exhibition from Venezuela. No information accompanies them, except that they are called *Sereipa*, and are from the province of Guayana. Careful inspection shows that they are the produce of two species, the smaller pods being apparently those of *M. frutescens* Jacq., and the larger those of some other species which I cannot identify.

MANNA.—Very few pharmacologists having seen any other form of this drug than that derived from the Manna ash (*Frazinus Ornus* L.), it is peculiarly interesting to find among the Materia Medica of the Exhibition at least four other kinds of manna, namely the following:—

1. *Manna of the Oak*.—Mr. H. S. Maltass, of Smyrna, has sent, together with various other interesting drugs, a saccharine substance called *Diarbekir Manna*, respecting which he has given me the following information, upon the authority of a relative who resided for two years in Diarbekir. The manna is found upon the leaves of the dwarf oaks, from which it is collected by the peasants, who use it instead of butter in cooking their food, and ascribe to it no purgative properties, at least while it is fresh. The manna is deposited upon trees much more copiously after misty weather than at any other period. The sample of oak-manna in the Exhibition constitutes a moist but solid mass of agglutinated tears, closely resembling some of the common qualities of ash-manna. Its taste is simply saccharine, and agreeable.

2. *Eucalyptus Manna*.—There are several specimens in the Exhibition of this substance, which is found in the form of small rounded opaque-white masses upon the leaves and younger

branches of *Eucalyptus viminalis* La Bill. The exudation, which is said to result from the punctures of insects, takes place most copiously in the early part of summer, at which time the manna appears as a translucent liquid, resembling thin honey, and gradually solidifies. This Australian manna has not hitherto been collected for medicinal purposes.

3. *Australian Insect-Manna* called *Lerp*.—Having only recently obtained a specimen of this substance which to me was previously unknown, I am unable to offer much information respecting it. According to the *Victorian Exhibition Report* published at Melbourne this year, we find that the leaves of *Eucalyptus dumosa* Cunn., called by the colonists *Mallee Scrub*, becomes coated at certain seasons of the year with an opaque white saccharine substance in such profusion, that the shrubby vegetation has the appearance of being iced. This substance, which among the aborigines of the northern districts of the colony obtains the name of *lerp*, is the secretion of an insect of the *Psylla* family, and consists (judging from the specimen in my possession) of a series of depressed hemispherical cells, each from a tenth to a sixth of an inch in diameter, placed contiguous to each other, and adhering together so as to form irregular flakes, sometimes an inch or more across. These cells are composed of a semitransparent, colorless, or yellowish substance, which is somewhat smooth in their interior, but which on their external surface forms transparent woolly filaments, so closely interwoven that the outer surface of a flake shows no evidence of the cellular structure beneath. Each cell is the habitat of an insect, which when fully developed, escapes by boring a passage through the top of the cell to the outer air.

The *Lerp* manna has an odor resembling manna of the ash, a similar color and the same clammy feeling to the touch; it has a saccharine taste, but does not dissolve in the mouth. It is not wholly soluble in cold water or in cold alcohol; boiled in water, it breaks down so as to form a turbid mucilaginous liquid, which is colored intensely blue upon the addition of iodine. Like the Australian manna previously noticed, the *Lerp* manna has not at present any useful application.

4. *Alhagi Manna* has been sent to the Exhibition from India. It is a saccharine substance in small, loose, dry grains

of a pale brown color, mixed with both leaves and pods of *Alhagi* (? *Mauvorum* Tourn.) It therefore differs in appearance from the Syrian alhagi-manna, sent by Dr. Gaillardot, of Saida, to M. Léon Soubeiran, which the latter describes as compressed into loaves or cakes.

**CINCHONA BARK.**—Neither Peru, Bolivia, Ecuador, nor New Granada have contributed any series of the Cinchona barks which are produced in their forests. There is, however, a fine general collection exhibited by Messrs. Howard and Sons, of London, and illustrated by drawings of the plants as well as by healthy living specimens of *Cinchona succirubra* Pav., *C. micrantha* R. et P., *C. Uratusinga* Pav., *C. nitida* R. et P., and *C. peruviana* Howard. Among the productions of the Dutch colonies are specimens of genuine Calisaya bark grown in Java, also of the bark of *C. Pahudiana* Howard, a species of very little medicinal value.

**BALSAM OF COPAIBA.**—The specimen sent from Trinidad is interesting as being entirely produced by one species, namely *Copaifera officinalis* Jacq., a tree abundant on the south coast of the island. Balsam of copaiba is not at present, I believe, an article of export from Trinidad.

**SEEDS OF SCAPHIUM: BOA-TAM-PAIJANG.**—In a recent number of the "Pharmaceutical Journal," I described and figured under the Chinese name *Ta-hai-tsze*, a drug which some years ago had an ephemeral reputation in Paris as a specific in diarrhoea and dysentery. From its resemblance to the fruits of certain species of *Erioglossum* and *Nephelium*, I conjectured it might belong to one of those genera, or at least to the Order *Sapindaceæ*. In May last, however, M. Decaisne requested me to examine whether it was not rather the seed of *Scaphium*, a genus of *Sterculiaceæ*, in which the follicles enclosing the seeds are monospermous, very large and leaf-like, and open long before the seed attains maturity. The correctness of M. Decaisne's opinion was soon confirmed by specimens of *Scaphium scaphigerum* Wall., contained in the herbarium of the Royal Gardens of Kew, and in that of the Linnean Society, and no doubt remained that the seed of that plant constitutes the drug called *Ta-hai-tsze* by the Chinese, and *Boa-tam-paijang*



and *Bung-telai* by the Siamese. The French collection of products from Cochin China includes a specimen of it, which in the catalogue is referred doubtfully to *Sterculia* (*Scaphium*) *scaphigera*; it is stated, though probably in error, to be used in dyeing. It is also sent to the Exhibition from Siam.

**RADIX BEHEN.**—This drug which held an important place in the medical writings of the Arab school, and which thence became introduced into most of the Pharmacopœias of Europe up to the commencement of the last century, was recently the subject of an interesting communication to the "Journal de Pharmacie et de Chimie," by Professor Guibourt, of Paris. There are two sorts of Behen, the *white* and the *red*, both of which have long been obsolete in Europe, though still found in the bazaars of the north-west of India, whence specimens have been sent to the Exhibition. White Behen is referred by all writers on materia medica to *Centaurea Behen* L., a plant of Persia and traditionally also of the Lebanon. Red Behen is generally attributed to *Statice Limonium* L., but the root of this plant, whether produced in Europe or in Asia, is so very different that I cannot suppose there is the least connection between it and the drug in question.

**AMOMUM FRUITS.**—The Exhibition contains the fruits of several species which are not without interest to the pharmacologist. Thus we find fruits of *Amomum cardamomum* L., and *A. xanthoides* Wall., sent from Siam and Cochin China; and fruits of *A. maximum* Roxb. from India. From the French settlements of the Gaboon River, come specimens of the fruits of *Amomum citratum* Pereira, a species of which we at present know very little, but which is remarkable for the agreeable lemon-like odor of its large angular seeds. The fruit of *A. Danielli* Hook. f., a very variable plant, common all along the coast of tropical Western Africa, is in one of the English collections, where we also find fruits of *A. latifolium* Afz., which are striking from their large size. *A. latifolium*, a native of Sierra Leone, was described by Afzelius in 1813 in his "Remedia Guineensis," published at Upsal, but it is a plant still almost unknown to botanists. There are specimens of two other fruits of *Amomum* from the Portuguese settlements on the west coast, which probably belong to undescribed species.

Fruits of *Amomum Melegueta* Rose., the seeds of which constitute the *Grains of Paradise* of the shops, are sent from the West Indies, where the plant, which has been introduced from Western Africa, thrives as well as in its native jungles. Lastly I may name as the most interesting of all, *Amomum Korarima* Pereira, the fruits of which have for ages been known as the *Greater Cardamom* (*Cardamomum majus*) though the name is now misapplied to Grains of Paradise. The true *Cardamomum majus*, which is figured and described in several of the older works on materia medica, is still an object of traffic in the East, and, strung upon strings, may still be seen adorning the stalls in the drug bazaar of Damascus. In Abyssinia it answers the purpose of small coin, and as such it figures in the collection exhibited by the International Decimal Association. The seeds of *A. Korarima* are an agreeable aromatic, in flavor much resembling the seeds of the common *Elettaria Cardamom*, and entirely devoid of the burning taste of Grains of Paradise. The plant for which the late Dr. Pereira proposed the name *Amomum Korarima* is entirely unknown; it is supposed to be a native of eastern Central Africa, whence its fruits are exported by way of Abyssinia and Massowah.

10 ROOT OF *STATICE LATIFOLIA* Sm.—Among the few drugs sent from Russia to the Exhibition, are specimens of the thick woody root of *Statice latifolia* Sm. (*St. coriaria* Pall.,) which is remarkable for its compact substance and large size, so unlike what is usual in other species of *Statice*; this root I have recognized to be identical with that imported some years ago into Marseilles, and described by M. Guibourt in his "*Histoire des Drouges*," tome 2, p. 416. With respect to its production and uses, I have been favored with the following remarks, by Mr. George Peterson, the Russian Commissioner of the Exhibition, who, as a member of the Scientific Committee for the Crown Lands of Russia, has the best opportunity for being correctly informed upon the subject. The "*Statice coriaria* of Pallas," says he, "grows wild in the whole prairie country of Southern Russia, known under the names of *steppes*, that is, land without forests. I have myself during two years travelled through this region, and seen roots of it of the length of more than thirty feet and with a top diameter of four and a half

inches. The plant is also found in the north of the Crimea and in the southern part of Bessarabia, but in general it is more common in the eastern part of the prairie region near the Wolga, and to the east of this river. To dig out the roots is very difficult, because the subsoil is hard and cannot be worked with a pickaxe. The root penetrates the soil and subsoil in a nearly perpendicular line; the longest roots are discovered on steep river banks, which are underwashed each spring-time by the swollen rivulets and also after heavy rains, the latter occurring very seldom. A small number of tanners have begun to employ the roots of *Statice*, but as the supply is precarious and the leather tanned with them brittle, no progress is made in utilizing this tanning material, which in more skilful hands has proved one of the best, as, for instance, in Spain."—*Lond. Pharm. Jour.*, Sept., 1862.

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A NEW METHOD OF CLARIFYING SACCHARINE LIQUIDS,  
JUICES AND SYRUPS, AND OF REVIVIFYING THE ANIMAL  
CHARCOAL USED IN THE MANUFACTURE OF SUGAR.

BY H. LEPLAY AND J. CUSINIER.

Of late years, most of the improvements in the manufacture of sugar have been directed to the disuse of animal charcoal. Having for many years witnessed the services which animal charcoal has rendered, and still renders, we have directed our researches in a direction entirely different. Our principal object has been to analyse the action exercised by animal charcoal on saccharine liquids at each stage of the manufacture, the duration of this action, and its exhaustion. We have sought to restore, by easy and speedy methods, the absorbing properties it loses by use, and to ascertain the cause of its various absorbing properties, on which chemistry hitherto has thrown but little light. This cause being discovered, we can, so to speak, increase it at will, and thus effect in saccharine liquids, juices, and syrups; a greater degree of purification than can be obtained by the ordinary means.

This study has led us to the discovery of a new method for refining saccharine liquids, and of revivifying animal charcoal,

as shown in the following principal results in the manufacture of beet-root sugar :

1. To completely do away with the use of fresh animal charcoal.
2. To abolish revivification at a high temperature (kilns for revivification, &c.)
3. To greatly reduce the quantity of charcoal used in the course of the work, and thus to effect a notable economy.
4. To obtain sugars of a superior quality, with a larger yield, without changing the apparatus now in use.
5. To reduce considerably the net cost of sugar.

Now, to point out this new method. In the ordinary manufacture, a filter filled with granulated charcoal lasts from twelve to twenty-four hours. The absorbing properties of the charcoal then appear to be exhausted, and have to undergo revivifying processes, the principal being calcination in a closed vessel at a high temperature. The animal charcoal thus revivified does not completely recover its primitive qualities, and its value as an absorbent is reduced one-half, and sometimes more.

In the ordinary method, all the absorbing properties of the animal charcoal are supposed to be exhausted at the same time, and the object of the revivifying process is to restore them equally and simultaneously.

The following is, on the contrary, the fundamental idea of our method :—

1. Granulated charcoal plays a manifold part, and has various absorbing powers, which act independently, and do not become exhausted simultaneously.

2. In the successive revivification of the absorbing properties of animal charcoal, according as they become exhausted, by various means appropriate to the nature of the matters the charcoal has absorbed.

3. In the possibility of augmenting at will the energy of the absorbing properties of the charcoal, and thus to render its refining action on juices and syrups more complete.

4. In obviating any necessity for a temperature higher than that of boiling water or free steam.

By investigating the process of the filtration of juices and syrups, we find that the exhaustion of the absorbing properties

of the charcoal can be divided into three periods, which we will examine successively.

The first series of absorbing properties is almost entirely exhausted after a few hours' filtering,—say, under ordinary circumstances, about four hours. These are the properties which affect viscous, nitrogenised, ammoniacal, sapid, and odorous matters, which injure the fluidity of syrups, their crystallization, the hardness and consistence of the grain, the quantity and quality of the sugar, and which impart to rough sugars the odor and flavor peculiar to the produce of the beet-root. We completely re-establish the primitive absorbing properties by passing a current of steam through the granulated animal charcoal contained in the filter. The absorbing properties of animal charcoal can thus be regenerated indefinitely.

A much longer time is required to exhaust the second series of absorbing properties. They last six or eight times as long as those of the first series. The period of exhaustion varies with the alkalinity of the defecated juices and syrups. Free alkalies, lime, potash, soda, salts of lime, and other saline matters are absorbed by the series in question. These matters especially contribute to color the juices and syrups during evaporation by destroying the sugar, and when present in large proportion prevent crystallization. We revive these absorbing properties by pouring a weak solution of hydrochloric acid over the charcoal contained in the filter and by sufficiently prolonged washings in water.

The third series comprise the absorptive properties of charcoal for coloring matters. They last thirty or forty times as long as the first series. Moreover, the presence of coloring matters in these syrups is of no great importance when they are transparent and brilliant and hold no matter in suspension. White sugars can be obtained from colored syrups, and when from the tint of the products, it is deemed necessary to revivify the power of absorbing coloring matters, we make use for this purpose of a weak solution of boiling caustic alkalies.

We use these various means of revivification either in the filter itself or in a special apparatus similar to the filter.

The various methods of revivification just described, restore the absorbing properties of the animal charcoal to their primi-

tive state, but without augmenting them. We have sought, in the production of a new fixed product in the charcoal itself, for the solution of the problem of augmenting the absorbing properties of charcoal.

When one equivalent of biphosphate of lime is added to one equivalent of tribasic phosphate of lime, identical with that which enters into the composition of animal charcoal, the two phosphates combine and form a third, which is a phosphate with two equivalents of base. This is explained by the following formula :



This new phosphate is insoluble in water, has no acid action on litmus paper, produces no inverting action on the sugar, and possesses very energetic absorbing properties.

What takes place in a test-glass with tribasic phosphate of lime is produced in the same manner in a filter filled with granulated animal charcoal when a weak solution of biphosphate of lime is poured over it. The same effect is produced with powdered animal charcoal. Charcoals treated in this way possess greater absorbing powers, which can be varied at will, and a smaller quantity of this charcoal suffices to produce a greater degree of refinement in juices and syrups.

Further, we have utilised for clarifying and purifying saccharine liquids the singular property possessed by the phosphate with three equivalents of lime, of precipitating itself in a gelatinous form, and of carrying with it all matters hindering the transparency of syrups, much more effectual than albumen, blood, and other matters used in clarification. In short, our processes are founded on attentive and inductive study of the singular and useful properties of different phosphates of lime, and of their application to the refinement of saccharine liquids, particularly beet-root juice and syrups.

The foregoing processes are in operation at two important sugar works in the department of the Oise,—one at Fraucières, belonging to MM. Bachoux and Co.; the other at Frogers, belonging to MM. Daniel and Co. The quantity of sugar made at these two works by our processes is now about 300,000 kilogrammes. This manufacture has sufficiently shown the value of our processes and the reality of the advantages they

offer. Our processes can be applied with like success to the manufacture of cane sugar as well as sugar refining.—*Chem. News*, May 10, 1862.

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ON LARIXINIC ACID, A CRYSTALLIZABLE VOLATILE PRINCIPLE FOUND IN THE BARK OF THE LARCH TREE (*PINUS LARIX*, LINN.)

By DR. JOHN STENHOUSE, F.R.S.

The most convenient way of preparing this somewhat singular substance consists in cutting the bark of the larch into small pieces, and then digesting it in water for twenty-four hours, at a temperature of about 80° C. The solution, which has a deep reddish-brown color, is then poured off on to a second portion of larch bark, and digested as before. The concentrated infusion is then cautiously heated in an open porcelain dish, at the temperature of about 80° C., till it is converted into a syrup. A portion of this syrup is then distilled, either in glass or porcelain retorts, or, what is better than either, in a silver alembic. Iron retorts cannot be employed for this purpose, as the acetic acid, which is always produced during distillation, by forming acetate of iron, instantly destroys the larixinic acid, by changing it into a deep purple-colored liquid. When a silver alembic cannot be procured, a very convenient way of distilling the extract of the larch is to pour it into a large Florence flask, the neck of which is passed obliquely through a cork or bung, which is inserted into a glass condenser. When the flask is cautiously heated on a sand-bath, the larixinic acid comes over with the first portions of the liquid, but becomes more abundant as the distillation proceeds, and usually forms large flat crystals, which condense on the sides and neck of the receiver. The liquid which is distilled over, and which contains the greater portion of the larixinic acid, should be poured into small flat basins, and cautiously concentrated at about 60° C. When the greater portion of the water has been dissipated, it is advisable, especially in warm weather, to complete the operation by spontaneous evaporation; for unless the concentration of the aqueous solution of larixinic acid is conducted cautiously, the larixinic acid volatilises along

with the vapor of water, and is thereby lost. The highly concentrated solution of larixinic acid, obtained in the way just described, on standing, deposits brownish-yellow crystals, which are impure larixinic acid. This is to be pressed between folds of blotting paper, and again to be crystallized out of a small quantity of water. The larixinic acid may be rendered perfectly pure by subliming it once or twice. This is easily effected by placing the larixinic acid between two watch glasses, or in any other suitable apparatus, and heating it cautiously on a sand-bath, or even on a water-bath, as the larixinic acid sublimes at the very low temperature of  $93^{\circ}$  C. The larixinic acid is a proximate principle, which exists ready formed in the larch. This is easily proved by distilling even a dilute infusion of the bark, when the liquid which passes over will be found to strike a deep purple color with a persalt of iron, which is very persistent. The bark of old larch trees contains very little larixinic acid; but the bark of the small branches, and that of the stems of the larch, when not more than from twenty to thirty years of age, contains very considerable quantities of this substance, the concentrated syrup from the portions of bark yielding more larixinic acid than an equal weight of catechu does of oxyphenic acid. Larixinic acid, after it has been purified by sublimation, forms beautifully white crystals, often more than an inch in length, of a brilliant, silvery lustre, very much resembling benzoic acid in appearance. They sublime at  $98^{\circ}$  C., and melt at  $153^{\circ}$ ; but its aqueous solutions volatilise at ordinary temperatures.

The smell of the aqueous solution of larixinic acid is sweetish, like that of a syrup, but the smell of the sublimed acid is very peculiar and slightly empyreumatic. As larixinic acid emits a sensible odor at ordinary temperatures, in this respect it considerably resembles naphthaline and ordinary camphor. The taste of larixinic acid is slightly bitter and astringent. It reddens litmus paper very slightly; but a single drop of potash or ammonia, when added to a solution of a large quantity of larixinic acid, renders it alkaline. Larixinic acid is very soluble in boiling water, but is by no means very soluble in cold water, 87.88 parts of water, at  $15^{\circ}$  C., dissolving one part of the acid only; but the solubility of larixinic acid in cold



aqueous solutions is greatly increased by the addition of either acids or alkalis. Larixinic acid is deposited from its aqueous solutions in crystals, which are very brittle, and often an inch or two in length. It likewise dissolves in cold alcohol, but to a much greater extent in hot alcohol. The crystals deposited from its alcoholic solutions are thicker and more distinctly formed than those from water. It also dissolves but sparingly in ether, and is deposited in crystals of very considerable lustre.\* The following are the results of the analysis of the larixinic acid:—

I. 0.221 sublimed acid, dried *in vacuo*, gave 0.4633 carbonic acid, and 0.1008 water.

II. 0.1993 sublimed acid dried *in vacuo*, gave 0.417 carbonic acid, and 0.0918 water.

III. 0.2272 larixinic acid, crystallised out of water, gave 0.4756 carbonic acid, and 0.1080 water.

Calculated numbers.

Found.

	I.	II.	III.
$C_{20} = 57.14$	57.13	57.06	57.09.
$H_{10} = 4.77$	5.04	5.09	5.04.
$O_{10} = 38.09$	37.83	37.85	37.87.

From these results it is evident that the carbon, hydrogen, and oxygen in larixinic acid are in the proportion of  $C_4H_2O_1$ , or some multiple of these numbers,  $C_{20}H_{10}O_{10}$  being the numbers we have adopted as the more probable.

When a quantity of larixinic acid was dissolved in a great excess of liquid ammonia, a yellow-colored solution was produced; when this was evaporated to dryness over sulphuric acid *in vacuo*, the larixinic acid was deposited in crystals which were nearly unaltered. It gave its characteristic reactions with salts of iron, and when boiled with milk of lime gave off no trace of ammonia. The combination which larixinic acid forms with ammonia is, therefore, so feeble that it is decomposed by the volatility of the ammonia. In this respect, therefore, and its forming no hydrate, larixinic acid closely resembles both pyrogallie and oxyphenic acids.

\* The crystals of larixinic acid catch fire readily and burn with a bright flame, leaving no residue.

When larixinic acid was treated with an excess of aqua potassæ it very readily dissolved, forming a yellowish solution. When dried over sulphuric acid *in vacuo*, the potash combination formed long flattish crystals having considerable lustre, but of a reddish-brown color. These crystals, when pressed between folds of blotting paper, to free them from the excess of potash and recrystallized *in vacuo*, yielded crystals which were more deeply colored than the first. This potash combination is so very feeble that it is decomposed by carbonic acid. It contained a considerable quantity of potash; but I have not been able to obtain it of a constant composition.

A solution of larixinic acid gives no precipitate, either with lime-water or with saccharate of lime. The behaviour of larixinic acid with baryta is extremely singular and characteristic. When a solution of caustic baryta is added to a concentrated aqueous solution of larixinic acid, the latter being in excess, a bulky, semi-transparent, gelatinous precipitate immediately falls, and if the solutions are concentrated fills the whole vessel. This precipitate, which considerably resembles hydrated alumina, is but slightly soluble in cold water, but it dissolves very readily in boiling water, from which it is again deposited on the cooling of the liquid. This baryta compound is readily decomposed by carbonic acid. When thrown on a filter and washed, the air being carefully excluded, it was dried *in vacuo* over sulphuric acid, and was then found to contain, as the mean of two experiments, 34.92 per cent. of baryta.

A solution of larixinic acid yields no precipitate with either basic or neutral acetate of lead, neither is it precipitated by nitrate or ammonio-nitrate of silver; but when its solution in the latter salt is boiled, the silver is reduced in a pulverulent state. Larixinic acid forms no precipitate with perchloride of platinum, even on the application of heat. It does not contain any nitrogen. It does not reduce oxide of copper when tried by Trommer's test. It dissolves in concentrated sulphuric acid, but no conjugate combination is produced, as was ascertained by neutralizing with carbonate of baryta, larixinic acid being obtained unchanged. When larixinic acid is boiled with a mixture of hydrochloric acid and chlorate of potassa, it is decomposed, but without the formation of chloranile. When it

is boiled with a solution of hypochlorite of lime, no coloration is produced. It is readily attacked by nitric acid, especially when assisted by heat; nitrous fumes are given off, and oxalic acid is the only fixed product. It is also readily attacked by bromine, especially when assisted by heat. Abundant vapors of hydrobromic acid are given off, the larixinic acid being entirely destroyed and converted into an uncrystallisable resin. The salts of copper produce an emerald green color in solutions of larixinic acid, but no precipitate. Chloride of manganese produces neither coloration nor precipitation. Protosulphate of iron strikes a brownish-red color with solutions of larixinic acid, which acquire a brighter red color on standing, resembling meconate of iron. Perchloride and persulphate of iron produce a beautiful purple dahlia-color, which is very persistent, and stands dilution well. Its reactions with salts of iron are very characteristic of larixinic acid, which forms an excellent reagent for the detection of salts of iron, even in very minute quantity. In this way the presence of iron, in tolerably pure sulphate of copper, can readily be detected by the purple coloration produced. Larixinic acid does not affect neutral protonitrate of mercury in the cold; and on the application of heat no mercury is reduced.

Larixinic acid appears to be peculiar to the larch-tree; at least I have not been able to find a trace of it in the bark of the spruce fir (*Abies excelsa*), or in that part of the Scotch fir (*Pinus sylvestris*.) Larixinic acid evidently belongs to that small group of substances of which pyrogalllic acid and pyrocatechine, the oxyphenic acid of Gerhard, are the only other members yet known. Larixinic acid is much less easily oxidisable than oxyphenic acid, which again is less easily oxidated than pyrogalllic acid. Larixinic acid volatilises at a much lower temperature than either of these two substances, from which it also differs in being a ready-formed proximate principle, and not an educt.

*Addendum.*—In consequence of the extremely feeble, if not somewhat doubtful, acid properties of the so-called larixinic acid, perhaps the name *Larazine* would be more appropriate; but in that case the name of pyrogalllic acid should be altered to *pyrogalline*, and that of oxyphenic acid to *pyrocatechine*, the name originally given to it by Zwenger.—*Trans. Royal Society*, 1862.

## Abstract of the Minutes of the Philadelphia College of Pharmacy.

At a stated semi-annual meeting of the College, held at the Hall, 9th mo. 29th, 1862. Present 17 members.

The President in the Chair. The Secretary being absent from the city, W. C. Bakes was appointed Secretary *pro tem*. The minutes of the last meeting were read and adopted, after which the minutes of the Board of Trustees, since the annual meeting, were read by Alfred B. Taylor, Secretary of the Board, from which it appears that H. T. Peck has been elected a resident member by the Board. The delegates appointed by the College to the American Pharmaceutical Association, reported through the Chairman, Samuel F. Troth, which report was accepted.

To the Philadelphia College of Pharmacy.

The Delegates to the American Pharmaceutical Association report:

That they all, with the exception of one member, attended the Tenth Annual Meeting of the Association, which was held in our hall on the 27th, 28th, and 29th of 8th mo. (August) last. The meetings, embracing five long sessions, were well attended, delegates from the Colleges of Baltimore, New York, Boston and Philadelphia, together with members of the Association from various parts of the United States, being in attendance. The proceedings of the Association were very interesting, and are in process of publication by the Committee charged with that subject. On behalf of the delegates,

SAMUEL F. TROTH, Chairman.

Charles Bullock, on behalf of the Committee on deceased members, read the following obituary notice on the death of our late fellow-member, Henry C. Blair, which was accepted and ordered to be entered on the minutes.

Henry C. Blair was born in Carlisle, Penna., on the 26th day of December, 1816.

Having learned the business of a pharmacist with Franklin R. Smith, at the corner of Eighth and Walnut Streets, he took the degree of graduate in Pharmacy in this College in 1836.

About two years subsequent, he succeeded to the proprietorship of the establishment in which he had received his professional education, and which in after years under his judicious management, became one of the most favorably known, and prosperous dispensing establishments in this city.

Though much engrossed with responsible business pursuits, Mr. Blair was not unmindful of the claims of the community, and of his profession in its organized capacity, upon his time and attention. In 1842 he became a resident member of this College, and was for many years an active member in its Board of Trustees. Soon after the establishment of the American Pharmaceutical Association he became a member of that body, and served as a delegate from this College to the fifth annual meeting of the Association in 1856.

His example and influence were favorable to the elevation of the stan-

dard of education and professional ethics among pharmacutists One of his characteristic and useful productions was a code of regulations for the organization and regulation of his own shop. The admirable discipline of this establishment was founded on a just appreciation of the rights and interests of the young men entrusted to his care, and their responsibility to himself and to the community. A healthy moral tone pervaded the establishment, and many young men educated to their vocation under his tuition, and who have for themselves since entered upon the duties of a business life, will appreciate the lessons he inculcated in all his intercourse with them.

For some years past, the failing health of our fellow member prevented his former zealous attention to business. Succumbing gradually to the inroads of pulmonary disease, he departed this life on the 20th day of August, 1862, aged 45 years, 7 months and 24 days, full of Christian faith and hope. Cut off in the prime of his life, his memory will long be cherished among those whose intercourse with him qualified them to estimate and prize his unobtrusive worth.

The report of the Committee on Herbarium, was read by George J. Scattergood, and on motion it was referred for publication in the Journal.

The Committee on Herbarium present the following report of its Chairman, John M. Maisch, in relation to plants found growing and collected in the neighborhood of New York City.

They also report the reception of a box of very fine specimens illustrative of the flora of our State, presented by Prof. Thomas C. Porter, transmitted through Charles A. Heinitsch, of Lancaster, Pa., comprising among others

*Coptis trifolia*, Salisb.  
*Caulophyllum thalictroides*, Mx.  
*Podophyllum peltatum*, L.  
*Dentaria diphylla*, L.  
 " *laciniata*, Muhl.  
*Barbarea vulgaris*, R. Br.  
*Solea concolor*, Girgen.  
*Viola rotundifolia*, Mx.  
 " *Canadensis*, L.  
 " *hastata*, Mx.  
*Helianthemum Canadense*, Mx.  
*Lechea major*, Mx.  
*Ascyrum Cruz-Andree*, L.  
*Hypericum ellipticum*, Hook.  
 " *Canadense*, L.  
*Elodea Virginica*, Nutt.  
*Aisne Michauxii*, Venzl.  
*Stellaria longifolia*, Muhl.  
*Linum Virginianum*, L.  
*Oxalis acetosella*, L.  
*Geranium Carolinianum*, L.  
*Acer spicatum*, Lam.  
*Polygala angulinea*, L.  
 " *cruciata*, L.  
 " *Nuttallii*, T. & G.  
 " *senega*, L.  
 " *pauciflora*, Willd.  
*Desmodium rotundifolium*, DC.  
*Lespedeza capitata*, Mx.  
*Stylosanthes elatior*, Swz.  
*Vicia Americana*, Muhl.  
*Phaseolus perennis*, Walt.  
 " *helvolus*, L.  
*Prunus pumila*, L.  
*Spiraea tomentosa*, L.  
*Delibarda repens*, L.

*Rubus odoratus*, L.  
*Crataegus coccinea*, L.  
*Ammaria humilis*, Mx.  
*Epilobium molle*, Torr.  
*Circea alpina*, L.  
*Hesperis Americana*, L.  
*Hydrangea arborescens*, L.  
*Chamaecypariss procumbens*, Lam.  
*Symphoricarpos vulgaris*, Mx.  
*Lonicera parviflora*, Lam.  
*Diervilla trifida*, Moench.  
*Cornus Canadensis*, L.  
*Fedia olitoria*, Vahl.  
*Liatris scariosa*, Willd.  
 " *spicata*, Willd.  
*Kuhnia eupatorioides*, L.  
*Eupatorium tenerifolium*, Willd.  
 " *rotundifolium*, L.  
*Sericocarpus solidagineus*, Nees.  
*Aster patens*, Ait.  
 " *dumosus*, L.  
*Diplopappus umbellatus*, Torr. and Gr.  
*Solidago latifolia*, L.  
 " *puberula*, Nutt.  
 " *speciosa*, Nutt., var. Aug.  
 " *rigida*, L.  
 " *orgata*, Ait.  
 " *adora*, Ait.  
 " *lanceolata*, L.  
*Chrysopsis Mariana*, Nutt.  
*Polymnia uerdalia*, L.  
*Xanthium spinosum*, L.  
*Gnaphalium purpureum*, L.  
*Nabalus albus*, Hook.  
*Campanula rotundifolia*, L.  
*Rhododendron maximum*, L.

*Dodecatheon Meadia*, L.  
*Lysimachia lanceolata*, Walt.  
*Epiphegus Virginiana*, Bart.  
*Salvia legrata*, L.  
*Phytostegia Virginiana*, Benth.  
*Phacelia parviflora*, Pursh.  
*Phlox divaricata*, L.  
*Ipomoea lacunosa*, L.  
*Nicanandra physaloides*, Gaertn.  
*Gentiana Andrewell*, Griseb.  
 " *saponaria*, L. var. *lin.*  
*Bartonia tenella*, Muhl.  
*Boehmeria cylindrica*, Willd.  
*Spiranthes cernua*, Richard.

*Pogonia verticillata*, Nutt.  
*Allium cernuum*, Roth.  
*Heteranthera reniformis*, Ring. and Pay.  
*Scleria triglomerata*, Mx.  
*Calamagrostis coarctata*, Tom.  
*Aristida purpurea*, Part.  
*Eragrostis pectinacea*, Beauv.  
*Festuca tenella*, Willd.  
*Atelosorus atropurpureus*, Kendl.  
*Campoceros rhizophyllus*, Rink.  
*Onoclea sensibilis*, L.  
*Lygodium palmatum*, Sats.  
*Lycopodium dendroideum*, Mx.  
*Teleginella apus*, Sporis.

The Committee have also preserved fresh specimens, this year, of a few of the plants common in this locality, though, from a variety of reasons, have not increased the collection much in this direction during the past season.

To the Philadelphia College of Pharmacy.

Shortly after the semi-annual meeting in September, 1861, the undersigned, Chairman of the Committee on Herbarium, removed to New York, and in consequence of his connection with the College of Pharmacy of the city of New York, will reside here permanently.

Owing to this removal, I have been unable to take an active part in the labors of the Committee. As soon as time and circumstances would admit, I have undertaken botanical excursions in the neighborhood of New York, and hoped to be able to lay before the College a report on the flora of this vicinity, as compared with that of Philadelphia. My experience is, however, by far too limited yet, so that I must confine myself to but few remarks.

From the proximity of this city to the sea coast, it was to be expected that in many respects, the flora here would be of a different character from that near Philadelphia. Many salt-water plants are growing here, not to be met with there, and a large number of exotic plants are found growing spontaneously or naturalized, which I have not seen in this condition near Philadelphia. The following list embraces these plants, which, from my present observations, grow more frequently in this locality; some of them, it will be observed, requiring a saline soil.

*Ranunculus sceleratus*, Lin. *Rhus copallina*, Lin. (Most frequent on Long and Staten Islands.) *Dianthus armeria*, Lin. *Spergularia rubra*, Pers. (Very frequent on the meadows of Hudson co., N. J.) *Hibiscus moscheutos*, Lin. *Berberis vulgaris*, Lin. *Trifolium agrarium*, Lin. *Medicago lupulina*, Lin. (Rather frequent in waste places.) *Melilotus officinalis*, Willd. and *albus*, Lam. (Both species are spontaneous on Long Island.) *Vicia tetrasperma*, Loisel. and *hirsuta*, Koch. *Potentilla argentea*, Lin. *Rosa micrantha*, Smith. (Spontaneous in West Chester co., N. Y.) *Rubus odoratus*, Lin. (Was found only near Guttenberg, N. J.) *Henea verticillata*, Kunth. *Opuntia vulgaris*, Mill. (This cactus is very frequent in New Jersey, several miles from Philadelphia; I have found it frequently on Manhattan Island and in Westchester co. *Pastinaca sativa*, Lin. (Appears to be perfectly naturalized in several localities on Manhattan and Long Islands.) *Cichorium endivia*, Lin. (Spontaneous in several places on Manhattan Island.) *Matricaria parthenium*, Lin. (Is rarely spontaneous near Philadelphia, more frequent on Long Island.) *Anthemis arvensis*, Lin. (Rather frequent around New York, while *Maruta cotala*, DeC., and *Leucanthemum vulgare*, Lam. are rarer here than in the immediate neighborhood of Philadelphia.) *Solidago lanceolata*, Lin. (Is very frequent in moist

places of Hudson co.; rarer in Camden co., N. J. Other species of this genus and of that of *Aster* could not be collected for want of time.) *Rudbeckia hirta*, Lin. *Pluchea camphorata*, DeC. *Iva frutescens*, Lin. (Both plants grow in salt-water marshes.) *Antennaria margaritacea*, R. Br. (This beautiful species is common on the dry hills of Long Island.) *Veronica hederæfolia*, Lin. (Becoming frequent on Staten Island and along the hills of New Jersey near the Hudson River.) *Thymus vulgaris*, Lin. (Spontaneous near Guttenberg, N. J.) *Anagallis arvensis*, Lin. *Solanum dulcamara*, Lin. and *nigrum*, Lin. (The last species was found by me only in one or two places near Philadelphia, but occurs scattered on both banks of the Hudson from Fort Hamilton to Westchester co., N. Y.) *Lycium barbarum*, Lin. (Becoming spontaneous.)

From the collections made during this summer, I have sent the following species to the College which were not heretofore collected by the Committee:

*Hibiscus moscheutos*, Lin. *Dianthus armeria*, Lin. *Spergularia rubra*, Pers. *Vicia tetrasperma*, Lois. *V. hirsuta*, Koch. *Melilotus albus*, Lam. *Medicago lupulina*, Lin. *Trifolium agrarium*, Lin. *Rubus odoratus*, Lin. *Rosa micrantha*, Smith. *Potentilla argentea*, Lin. *Nasæa verticillata*, Kunth, var. *pubescens*. *Pastinaca sativa*, Lin. *Antennaria margaritacea*, R. Br. *Gnaphalium purpureum*, Lin. *Iva frutescens*, Lin. *Pluchea camphorata*, DeC. *Cichorium endivia*, Lin. *Rudbeckia hirta*, Lin. *Anthemis arvensis*, Lin. *Lysimachia lanceolata*, Walt. *Anagallis arvensis*, Lin. *Thymus vulgaris*, Lin. *Salix fragilis*, Lin., var. *Russelliana*. *Microstylis ophioglossoides*, Nutt. *Aplectrum hyemale*, Nutt.

With regard to the botanical exchanges with Europe, I have to remark, that I owe an answer to Dr. Flükiger, of Bern, and I shall advise him of the Committee, if I be favored with a notice of its election. I would merely remind, that besides plants, he desires specimens of strictly American drugs, in exchange for which he will furnish such plants and drugs of Switzerland, as the Committee may designate.

No answer has yet been received from the other gentlemen to whom botanical specimens were sent.

All of which is respectfully submitted,  
*Brooklyn, N. Y., September 27th, 1862.*

J. M. MAISCH.

John M. Maisch having removed to reside in New York, tendered his resignation as a member of this College. After some expression of opinion, the following resolution was unanimously adopted:

Resolved, That the resignation of John M. Maisch be laid on the table, and that in consideration of his valuable services to this College, his annual contributions be remitted.

William Procter, Jr., Editor of the American Journal of Pharmacy, called attention to the clause, in the 101st section of the law to provide Internal Revenue, &c., exempting official preparations, and others—the formula of which have been made public—from the stamp duty imposed upon medicines and preparations, and stated that he was in receipt of a number of letters from various parties enclosing recipes for publication in the Journal, and suggested some action of the College to meet the emergency. The following preamble and resolution, by Edward Parrish, were read by William J. Jenks, and unanimously adopted, ordered to be entered on the Minutes, and published in the Journal.

*Whereas*, by the terms of the law to provide internal revenue, and to pay the interest on the public debt, a specific stamp tax is laid on all secret or proprietary medicines, and an exception made in favor of preparations of which the "full and proper formula is published in any Pharmaceutical Journal now issued by any incorporated College of Pharmacy;" and

*Whereas*, attempts will probably be made to evade this tax by the publication of formula of no public interest, through the American Journal of Pharmacy, which was established with an exclusive view to the advancement of Pharmaceutical knowledge, and discouragement of quackery and empiricism; therefore

*Resolved*, That the Editor and Committee of Publication be and are hereby instructed to decline the insertion in the Journal of any empirical or other formula not adapted to increase pharmaceutical knowledge, or to promote the general interests of the profession, and that we will discourage any evasion of the law by those to whom it was designed to apply.

Charles Bullock proposed that a Committee be appointed to confer with Commissioner Boutwell, with reference to various points in the law requiring some explanation, and that a copy of the foregoing resolution be enclosed to him, and that the Committee have power to use the seal of the College, and report to the Board of Trustees at its next meeting. Charles Bullock, Alfred B. Taylor, and William Procter, Jr., were appointed on that Committee. On motion, Peter Williamson was also added to this Committee as Chairman.

The semi-annual election of Trustees, &c., was now ordered, John C. Savery, and Samuel S. Bunting acting as tellers, who reported the following as elected:

*Trustees.*

Wilson B. Pile,  
Charles Bullock,  
Alfred B. Taylor,  
William Evans, Jr.

Evan T. Ellis,  
William J. Jenks,  
George J. Scattergood,  
William C. Bakes.

*Committee on Deceased Members.*

Edward Parrish.

William Procter, Jr.,

Charles Bullock.

*Committee on Herbarium.*

George J. Scattergood,

William R. Warner,

Thomas P. James.

On motion, the College adjourned.

WILLIAM C. BAKES, *Secretary pro tem.*



## Editorial Department.

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**THE LATE MEETING.**—In the haste incident to getting out the detailed notice of the proceedings of the Association at the end of our last number, we entirely forgot to allude to an episode of the outside history of the meeting, which in proportion to its extent was largely productive of good fruits. At the close of the meeting on Friday, Aug. 29th, Edward Parrish invited those members who were strangers to join in a yachting excursion up the Delaware to Riverton, to return late in the evening by steamer. A number of gentlemen accepted the invitation, and between 4 and 5 o'clock the party having embarked at Smith's Island on two yachts were soon careering up the river by aid of a stiff breeze. As both vessels were good sailers, some excitement grew out of the competition to reach Riverton; and as, from the direction of the wind and the course of the river, some tacking was required before the boats were sufficiently to the windward to pass Treaty Island, ample room was afforded to the commanders to contend for the advantage. The gentlemen expressed themselves much gratified with the sail, which, varied as it was by objects of interest along the right bank of the river and the excitement of managing the vessel under a strong breeze, was to us very pleasant.

Arrived at Riverton, the party were landed in boats, and conducted to the residence of Mr. Parrish, where we were welcomed by Mrs. Parrish, who, "on hospitable thoughts intent," soon after invited the party to partake of an excellent entertainment, to which they did ample justice. The evening, which was agreeably cool, passed off pleasantly in conversation during a stroll along the bank of the river; and as the period for returning approached, the party collected on the pier to await the steamer, which in due time was seen in the distance; but lo! she kept on her course despite the tolling of the bell, and left the party to provide a passage in some other way. The disappointment was taken in good humor, and finally it was arranged that some should return to the city by private conveyance, others took the late line to N. York, whilst the remainder were comfortably accommodated for the night, and left for their several homes on the following morning, well pleased with their trip.

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**"THE JURIES BILL" IN THE BRITISH PARLIAMENT.**—After a considerable struggle this bill has become a law under the caption "An act to give greater facilities for summoning persons to serve on Juries, and for other purposes relating thereto." The main cause of the struggle arose from the following clause inserted through the exertions of the council of the Pharmaceutical Society, viz. "All persons duly registered as pharmaceu-

tical chemists according to the provisions of an act entitled "An Act for regulating the qualifications of pharmaceutical chemists," shall be and are hereby absolutely freed, and exempted from being returned, and from serving upon any Juries or Inquests whatsoever, and shall not be inserted in the lists to be prepared by virtue of the principal Act of this Act." After being rejected in the House of Commons, it was passed in the House of Lords, the amendment again rejected by the Commons, but in a modified form retaining all that related to the pharmaceutical chemists, it passed the Commons on the 31st of July, to the great gratification of the members of the Pharmaceutical Society, who in addition to other privileges are thus publicly exempted from a very onerous public duty.

But while the 2000 or 2500 members of that Society are thus exempted, perhaps 30,000 other persons under the name of chemists and druggists are yet subject to the Jury service. This public and legal endorsement of the society must raise its status yet higher, and offer a powerful inducement to chemists and druggists to qualify themselves for membership, which is open to all who will undergo the legally requisite ordeal.

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**THE INTERNATIONAL EXHIBITION AT LONDON, 1862.**—The Report of the Jury on section B—Medical and Pharmaceutical Products and Processes—has just been received from the Secretary, Mr. Daniel Hanbury. The Report is too long to republish entire, but the following extracts from it are offered for the information of our readers. The Jury consisted of Prof. Von Fehling, of Stuttgart, Chairman, Daniel Hanbury, of London, Secretary, Mr. Morson, Dr. Redwood and Mr. Warrington, of London, Dr. Neligan, of Dublin, Prof. Schroetter, of Vienna, Prof. Tomasi, of Paris, Prof. Wurts, and M. Menier, of Paris.

The report is in three sections: 1. Pharmaceutical products from the mineral kingdom, including preparations like iodoform, chloroform, carbolic acid, alkaline and earthy salts, metals and metallic salts. These we must pass over for the present, and occupy what space we can afford with the second and third parts.

## 2. PHARMACEUTICAL PRODUCTS AND PREPARATIONS FROM THE VEGETABLE KINGDOM.

*a. Vegetable infusions, decoctions, and solutions.*—Numerous specimens of aqueous infusions and decoctions in a concentrated form, preserved with a minimum amount of alcohol, are exhibited in the British section of the Exhibition. Many of these preparations, which display considerable pharmaceutical skill, would doubtless be found useful and convenient medicines, but the Jury can by no means admit that their employment in the place of freshly made infusions would be a desirable innovation. Analogous to the proceeding, but in a still more concentrated form, may be mentioned the preparations known as *fluid extracts*, a considerable variety of which are used in North America, as may be seen by examining the specimens contributed by the Philadelphia College of Pharmacy, and by Mr. W. Saunders, of London, West Canada. The only fluid extract in common use in England is that of *sarsaparilla*, a preparation containing about half its weight of extract of pilular

consistence, together with a little alcohol. Several other fluid extracts are exhibited, as those by Messrs. Savory and Sons, which include fluid extracts of opium, taraxacum, rhatany, roses, sumbul, &c. These preparations are stated to contain about fifteen per cent. of glycerine.

Solutions of various medicinal substances in pure glycerine, called *Glycerides*, are shown by Mr. W. Dickinson, of London, as convenient preparations for the external and internal administration of medicines. Among a considerable number we have observed the following:—Glyceride of aloes, of senna, of chloride of zinc, of bromide of iron, of iodide of sulphur, and of sulphuret of potassium.

*b. Tinctures and syrups* are shown in the collection of medicines exhibited under the auspices of the Pharmaceutical Society of Great Britain; there are also some preparations of this class contributed by Holland, Portugal, and Turkey.

*c. Extracts and inspissated Juices.*—The collections of these preparations in the British section of the Exhibition appeared to the Jury, for the most part, highly commendable. Among those that were noticed with especial satisfaction, the extracts of Mr. Holland, of Market Deeping, and of Mr. Ransom, of Hitchin, may be cited. The Jury had also great pleasure in examining the extracts prepared by Mr. Squire, Messrs. J. Watts and Co., Messrs. Wright, Francis and Co., Messrs. Curtis and Co., and Mr. W. Hooper, all of London. But few pharmaceutical extracts have been sent to the Exhibition from abroad, which is probably due to the unattractive appearance of such preparations, and also to the fact that in Germany at least they are not manufactured on a large scale, but generally in the laboratory of each pharmacist. An Austrian exhibitor has however contributed a series of the extracts prescribed in the Austrian Pharmacopœia; the Jury have examined them, but have not been favorably impressed with them as compared with similar products from English laboratories.

In France, extracts are extensively manufactured by M. Berjot, of Caen, who exhibits a large number. These extracts, which in appearance are entirely different from those of the British pharmacist, are prepared *in vacuo*, the evaporation being carried to complete dryness. Thus produced, we find them in the form of dry pieces, often several inches in length, and of an oblong form, very porous and light, and generally pale in color. Extract of liquorice for instance, as shown by Mr. Berjot, is in extremely light and spongy, pale-bluff, brittle, oblong cakes; in fact, in appearance it suggests pieces of *dried frith*. All the extracts are contained in wide-mouthed bottles, each provided with a hollow metallic stopper ingeniously contrived to contain *lime*, the object of which is to absorb the humidity of the air necessarily admitted each time the bottle is opened. In fact they are mostly so hygroscopic, that without some precaution of this nature, it would be impossible to maintain them long in their original condition; as evidence of which we may state that three or four of which we enclosed small specimens in pill-boxes, were found at the expiration of a few days to have shrunk to perhaps a tenth of their usual volume, and to have assumed the form of ordinary soft extracts.

Of the care with which M. Berjot's extracts are prepared we entertain no doubt; but we are far from being convinced of the expediency of carrying the desiccating process to the highest extent, and of attempting to maintain the extracts in a perfectly dry condition for daily use. We think that such extracts present in general a very favorable condition for transport to other countries, being, we should imagine, susceptible of no change so long as they are kept dry. But upon the shelves of the dispensary, where a large business is carried on, we can imagine that they would, from their proneness to change, be a source of perpetual annoyance. Still as we are assured\* that M. Berjot disposes commercially of his dry extracts to the extent of 4400 lbs. (2000 kilo.)

\* 'Bulletin de la Société d'Encouragement,' t. viii. (1861), p. 143.

annually, it appears evident that our objections have not all the practical force we should otherwise claim for them. Vegetable extracts, also prepared in *vacuo*, and reduced to dryness, but in a massive and not porous form, are shown by M. Menier, of Paris.

*Extract of liquorice* is exhibited by several Italian, French, and Spanish manufacturers, amongst whom may be mentioned the house of Barracco, which produces 200,000 kilo. annually. Very good extract is also shown in the Austrian section by M. Quapill, to whom is due the merit of having introduced the manufacture of liquorice into Moravia.

Under the head of extracts it is proper we should also notice the substance called *podophyllin*, recently introduced from the United States into British medicine as an alternative and purgative. Podophyllin is prepared from the root of *Podophyllum peltatum*, L. (*Ranunculaceæ*) by exhausting it with alcohol, concentrating the alcoholic solution, and pouring it into water. The dark-greenish resin thus separated, constitutes, when washed and dried, *podophyllin*. The same process is said to be adopted in America for extracting resin from numerous other roots, as those of *Sanguinaria canadensis* L., *Veronica virginica* L., *Hydrastis canadensis* L., *Iris versicolor* L., &c., &c.

*d. Essential oils (medicinal).*—The most extensive and remarkable collections are those contributed from Leipzig, where a very important manufacture of these products is carried on by the firms of Heine and Co., E. Sachsse and Co., and Schimmel and Co. Several of the oils exhibited by those houses were entirely new to most of the Jury. The essential oils of Dr. F. G. Geiss, of Aken-on-Elbe, near Magdeburg, of Dr. Wagner, Pesth, of Dr. Lamatsch, Vienna, and of Messrs. Boyer and Heil, and Co., of Gignac, Herault, France, deserve commendation. In the British section the essential oils, though fewer in number than the foreign, are not less excellent. The principal exhibitors deserving mention are Mr. Holland, of Market Deeping, and Mr. Ransom, of Hitchin. The collections just named are those of manufacturers on a large scale; but numerous other specimens of more or less importance have also been observed by the Jury. *Cajuput oil* is sent from the Dutch East Indies, a sample also from New Caledonia, and one from New South Wales. *Oils of peppermint* and *wintergreen* are contributed by the United States, and *otto of rose* by Turkey. There is also a sample of the essential oil with which otto of rose is adulterated, contributed by Mr. S. H. Maltass, of Smyrna; this oil which, we believe, is now almost invariably mixed with the Turkish otto, is the produce of *Andropogon pachnodes*, Trin., a fragrant grass, abundant in the north-western provinces of India, and not, as sometimes stated, of a pelargonium. It is shipped from Bombay, whence it is carried to Turkey, partly by native traders by way of the Red Sea and Egypt, and partly by way of England. From its similarity in odor to the essential oil distilled at Cannes in Provence, and in Algeria, from *Pelargonium Radula*, Ait. var. *roseum*, it is frequently sold under the name of "*Turkish oil of Geranium*."

*e. Fixed Vegetable Oils.*—Of these substances those alone which could claim the application of medicinal were considered to belong to our Jury, the remainder being referred to Class IV.

*Castor Oil and Seeds.*—The exhibition contains numerous samples of this oil, of which those produced in Italy deserve particular attention. This castor oil is extracted from the seed grown in the north of Italy, where the plant is doubtless an annual. That shown by M. Mazzuchetti, of Turin, appeared to be of excellent quality; the suite of specimens, including the seeds in various states, exhibited by Messrs. Valeri and Co., of Legnago, province of Verona, deserves mention. The latter firm are stated to produce by cultivation 2,000,000 kil. of seed annually. There are numerous other samples of castor-oil seeds, more or less remarkable for their variation in size, color, and markings, contributed by other countries, frequently accompanied by the oil. Those shown by M. Bélanger, director of the botanical garden at St. Pierre-Martinique, comprising half a dozen sorts, each with the botanical name of

the particular species of *Ricinus* yielding it, would form an acceptable addition to any collection of *Materia Medica*.

*f. Vegeto-Alkalies, their Salts, and other Crystalline Principles of Medicinal Substances.*—In this department the Exhibition presents a display which is highly creditable to the progress of chemical knowledge, and its application to industrial purposes. Nor should it be otherwise when we reflect on the extraordinary attention which organic chemistry has of late received, the great diffusion of knowledge regarding its laws, and the numerous triumphs which in various directions it has achieved.

Vegetable alkaloids are contributed by England, France, Germany, Italy, Turkey, and Brazil—many of them as specimens of unequalled purity and beauty. To commence with the most important, we will notice those of cinchona bark.

*Quinine.*—The sulphate is exhibited by two English and several German, French, and Italian manufacturers. Many of the samples were chemically examined by the Jury, and were found in every case to be of satisfactory purity. The purity of a drug so important and high-priced as quinine ought to engage the attention of each pharmacist, who should rigorously refuse all which may not stand the required tests, nor should the medical man and the directors of hospitals exercise a less vigilant care. The use of quinine imperfectly purified is open to objection, for which the reduction in price by no means compensates. The admission of so valuable a medicine in a form acknowledged to be impure, and that without any standard by which to determine the amount and nature of impurity which are to be held allowable, affords opportunity for sophistication only limited by the principle or prudence of the manufacturers. In such a compound, the question must naturally arise: How much of this effect is due to the quinine, how much to the quinidine, and how much to the other constituents of this preparation? We think it would be altogether more scientific to discard such a substance, and to employ the cinchona alkaloids in those forms of purity in which they are now so easily obtainable.

The quinine salts exhibited are very numerous, and, we may add, very unnecessary, so far as medicine is concerned. The citrate, phosphate, hypophosphite, hydrochlorate, acetate, lactate, valerianate, tannate, kinate, picrate, and hydroferrocyanate are all to be seen.

*Cinchonine* and *quinidine*, and their salts, are also displayed in several collections; *aricine* and its sulphate, so far as we are aware, in only one—that of Messrs. Howards and Sons. This house also exhibits a specimen of the cinchonidine of Pasteur, and a very large one of its sulphate. Sulphate of cinchonidine is also contributed by Messrs. Dufour Brothers, of Genoa.

We may also here name as eminently worthy of notice (mainly as an indication of skill and patience) the extraordinary series of cinchona products displayed by Dr. Zimmer, of Frankfort-on-Maine. This series, which numbers about a hundred specimens, includes combinations of the cinchona alkaloids, quinine, quinidine, quinic acid, cinchonine, and cinchonidine, with a great variety of acids, mineral and vegetable. It also includes, what are far more interesting, pure kinic acid, colorless and well crystallized, kinate of lime, pure cinchona-bark wax (a greenish-gray substance), the fatty acid of this wax in a pure state called cincho-cerotic acid (*Cincho-cerotinsäure*), dalleiochin, &c.

The chemical products of opium are extremely well represented by exhibitors from Great Britain, France, Germany, and Italy. M. Menier, of Paris, displays crystals of pure morphia, which are the finest we ever saw, and his hydrochlorate of the same base is hardly less excellent. Codeine forms a striking object in the case of Messrs. J. F. Macfarlan and Co., of Edinburgh, whose specimen has the form of a large basin of crystals. Messrs. T. and H. Smith, of Edinburgh, Morson and Son, of London, and Menier, likewise exhibit good specimens of this alkaloid; but for magnitude of crystals there is nothing to equal that shown by M. Merck, of Darmstadt. Of the other prin-

ciples contained in morphia, we may signalize the following as being remarkably well shown:—The narcotine of Messrs. Morson and Son, meconine of M. Menier, papaverine, narcotine, muriate of thebaine, and meconic acid of Messrs. Smith; the last named firm also exhibit a body named by them *thebo-lactic acid*, of which they claim the discovery, but of which no account has yet been published. They also show two thebo-lactates, namely those of copper and of morphia.

*Strychnia*.—The only British manufacturer on a large scale is, we believe, Mr. Hulle, who exhibits excellent specimens of the alkaloid and its salts. From the Continent we find strychnia contributed by M. Menier and Messrs. Laurent and Casthelaz, of Paris, and M. Merck, of Darmstadt. M. Menier, whose strychnia is in crystals of remarkable size and beauty, is also the exhibitor of a large specimen of *igasurine*, the only one we believe in the Exhibition. This alkaloid, which was discovered by Desnoix about the year 1853, is contained in *nux-vomica*, from the liquors of which, produced in the manufacture of strychnia, it may be separated after the precipitation of that alkaloid and the brucine by lime at a boiling temperature. From these aqueous liquors the igasurine, in an impure state, may be obtained by evaporation.\* Igasurine is said to have medicinal powers of the same character as strychnia; but we are not aware that exact observations upon this subject have yet been instituted.

The collection of organic chemical products shown by M. Merck includes several substances of great interest and rarity, exhibited in very considerable quantities. Of such we may mention *elaterine*, of which there is a large specimen, well crystallized and perfectly white; also *cubebine*, *delphinine*, *anemonine*, *sulphate of sabadilline* and *scoparine*.

*Atropine*, now frequently used in the form of sulphate, for the dilation of the pupil, is shown M. Menier.

Messrs. Morson exhibit the valerianate, a salt the use of which in medicine is very undesirable, on the ground that it is not only highly deliquescent, but that it constitutes a gummy mass which it is no easy task to weigh with accuracy. It is moreover impossible to believe that the alkaloid combined with valerianic acid can occasion effects which would not be produced by the sulphate, a salt presenting no such objections.

*Aloine*.—Messrs. T. and H. Smith, of Edinburgh, to whom is due the discovery of aloine in 1851, exhibit it in the form of a mass of brownish-yellow crystals, which are not without beauty. Crystals of aloine, in great abundance, occur in a variety of Socotrine aloes, imported a few years since, which was in a semi-fluid condition, the evaporation not having been carried to the usual limit. In the aloes in question, the aloine subsides in the course of time to the bottom of the vessel as a yellow mass, the supernatant aloes being dark and transparent.

*Aconitine*, both amorphous and crystallized, is shown by Messrs. Morson and Son. The aconitine of these manufacturers is well known for its superiority in virulence, a fact which enables it to command a very high price. Messrs. Hopkin and Williams are also English manufacturers and exhibitors of this alkaloid.

*Bibirine* and its sulphate are contributed by Merck, of Darmstadt, and Macfarlane, of Edinburgh. A sample of the sulphate (now not unfrequently prescribed in London) is also sent by Mr. Knowles, of Demerara, from which colony the Bibira Bark is an export.

*Santonine*, which has come into extensive use since the Exhibition of 1851, is chiefly manufactured in Germany. Messrs. Böhringer and Sons, of Stuttgart, who prepare it on a very large scale, exhibit one of the numerous excellent samples submitted to the Jury.

*Pereirine*.—This alkaloid is exhibited by Messrs. Rzequiel Correa dos Santos e Filho, Messrs. Aleixo Gary and Co., and Mr. Peckolt, all of Brazil; and is

\* Gerhardt, 'Chimie Organique,' vol. iv. (1856), p. 182.

also to be found in the case of one English exhibitor. Its history dates from 1839, when it was discovered by Blanco, of Rio Janeiro,\* in the bark called in Brasil *Pao Pereira*, and valued in that country as an excellent febrifuge and tonic. This bark, the origin of which has long remained uncertain, has recently been ascertained by Dr. Allemão, of Rio Janeiro, to be derived from *Geissospermum Vellozii*, Allem., a tree of the order *Apocynaceæ*. Pereirine is obtained by exhausting the pereira-bark with acidulated water, and treating the concentrated liquor with ammonia, which throws down the impure alkaloid. This may be rendered pure by re-solution in an acid, treatment with charcoal, and precipitation by ammonia. It then constitutes a pale-brown, pulverulent substance, which has not hitherto been obtained either colorless or in crystals. It is soluble in alcohol or ether, restores the blue of reddened litmus, unites with diluted acids to form neutral salts, which are mostly soluble in water or alcohol, but which, like the base, have only been obtained in an amorphous condition. An aqueous solution of a salt of pereirine is colored deep crimson by strong nitric acid; a reaction which takes place even when the solution is dilute. We are not aware of any ultimate analysis of this alkaloid having been made.

*g. Vegetable acids.*—*Tartaric* and *citric acids* are so well and extensively represented in all parts of the Exhibition, that we may be excused from mentioning the samples of any particular manufacturer.

Of *Racemic acid*, a specimen by Wagenmann of Vienna is shown in the Austrian Court.

*Valerianic acid*, in three forms—anhydrous, monohydrated and trihydrated—is contributed by Dr. Marquart of Bonn, who likewise sends fine *succinic* and *malic acids*, both colorless and pure.

*Gallic* and *tannic acids* are freely exhibited. One specimen, that of gallic acid shown by Messrs. Dunn, Heathfield and Co. of London, is remarkably beautiful for its crystallization.

*Cainic acid*, extracted from cainca root (*Radix Chiococca anguifuga*, Mart.) is among the rare products shown by Mr. Merck.

*h. Unmanufactured Drugs of Vegetable Origin.*—In the British section of the Exhibition there is a numerous collection of these products exhibited by various contributors, chiefly under the auspices of the Pharmaceutical Society of Great Britain. The samples are mostly very fine; some of them in fact almost *too good*, as they represent exceptional rather than usual forms of the drugs they illustrate.

The British colonies, including India, contribute large collections of vegetable *Materia Medica* which will repay careful study. The colonial possessions of France are also well represented, the suites of specimens from each being admirably arranged and clearly catalogued upon one general plan. We also find contributions of raw drugs from the South American Republics, Brazil, the United States, West Africa, Turkey, China, Japan, and the Philippines.

As it would unduly extend the present Report were we to attempt a detailed account of these numerous collections, we shall restrict ourselves to name a few of the more important, and also to mention in addition a few drugs which claim notice on the ground of recent introduction to European medical practice.

North American drugs are illustrated by a very excellent and numerous collection contributed by the Philadelphia College of Pharmacy. There are also numerous well-preserved specimens forwarded by Mr. William Saunders of London, Canada, and by Mr. Giroux of Quebec.

To H. E. Faik Pasha of Constantinople, the Exhibition is indebted for a very extensive series of specimens of raw products, alimentary, medicinal,

\* *Bayerlinus*, "Jahresbericht über d. Fortschritte d. Chemie et Mineralogie," 23 Jahrg. 1844), p. 372.

&c., from Turkey, amongst which the numerous samples of opium deserve particular attention.

Mr. Sidney H. Maltass, of Smyrna, is also the exhibitor of a fine series of opiums, besides scammony, tragacanth, and some other drugs of Asia Minor.

M. Bélanger, director of the Botanic Garden at St. Pierre, Martinique, contributes an instructive series of West Indian drugs, which the Jury consider well deserving of commendation.

Mr. Theodore Peckolt, pharmacien of Cantagallo, Brazil, has sent a collection of small specimens of Brazilian drugs, which deserve the attention of pharmacologists.

Dr. Welwitsch, who has recently returned from a visit of several years to the Portuguese territories on the west coast of Africa, contributes numerous remarkable raw products collected during his journeys in those little-known regions; but the specimens being neither catalogued nor well arranged are not displayed as they deserve.

The productions of Hungary, including a few well-preserved drugs, are displayed in the collection of Mr. Vincent Jankó, of which a convenient separate catalogue is published.

The great project of introducing the *Cinchona* into India receives an illustration from two or three inconspicuous jars containing cinchona bark, produced upon the plantations of the Dutch Government in Java, contributed, together with botanical specimens of *Cinchona Calisaya*, Wedd. and *C. Pichudiana*, How., by Dr. Junghuhn.

Of the drugs which have to a greater or less extent come into use during the past few years, we may mention the following:—

*Resin of Scammony-root.*—The rude methods employed for the collection of scammony, and the extreme variability of that drug, induced Mr. Clark, an extensive manufacturer of extract of liquorice, residing near Smyrna, to suggest the advantages that would arise from replacing it by the pure resin obtained by a suitable process from the dried root. Mr. Clark not having in Asia Minor the requisite appliances for such a pharmaceutical operation, some of the root was forwarded to Professor A. W. Williamson of University College, London, who, after various experiments, recommended the following process:—The roots, previously crushed, are to be boiled first with water and afterwards with diluted acid, by which means they will be deprived of all matter soluble in those menstrua, while the resin will be left undissolved. They are then to be treated with alcohol, and the alcoholic solution being evaporated, the pure resin will remain. Numerous comparative trials of this resin have been made in the hospitals of London, and have established the conclusion that it is quite equal in medicinal activity to the best scammony. The substitution of resin of scammony-root for scammony, is not, however, officially sanctioned, and the new drug has as yet met with but little demand.

*Root of Actæa racemosa*, L. (*Ranunculaceæ*).—This drug which has for many years had a place in the *Materia Medica* of the United States, has recently come into considerable use in England as a remedy in rheumatism, particularly in its acute forms; it has also been successfully employed in chorea, nervous headache, hysteria, &c. As a complete account of the drug, its natural history, mode of administration, &c., by Professor Bentley of London, has been recently published,\* we think it unnecessary to enter into further particulars respecting it.

*Kamala*, is the Indian name of a brick-red powder, which consists of the minute glands rubbed from the capsules of *Rottlera tinctoria*, Roxb., a tree occurring in many parts of the East Indies. It is employed in medicine as a vermifuge, and is very effectual in the dose of one to two drachms; it may also be given in the form of tincture. Kamala has been imported into London to a considerable extent, and chiefly shipped to the Continent.

*Bark of Larix Europæa*, DC.; *Larch bark*.—It has been recently recom-

\* "Pharmaceutical Journal and Transactions," for March, 1861.



mended as a stimulating expectorant, and has been prescribed by a few medical men in London and Dublin, in the form of tincture and extract. The bark, which contains numerous cells filled with resin, has an agreeable terebinthinous odor; whether it possesses any real advantage over the numerous terebinthinous remedies already in use, may well be doubted. We may mention, however, that a crystallizable volatile principle, to which the name *larizinic acid* has been given, has recently been obtained from larch bark, which at present is its only source: also that the bark contains a peculiar form of tannin.\*

*Guaco*.—Attention has been recently called to the medicinal effects of the stems of certain species of *Aristolochia*, commonly known in South America by the name of *guaco*, and there used against the bites of venomous serpents. The drug is quite distinct from the stems of *Mikania Guaco*, H. B. K., also called *guaco* in some parts of New Granada. A good specimen, derived from *Aristolochia trilobata*, L., is sent from Trinidad by Mr. Sylvester Devenish of that island.

Bark of *Cerasus virginiana*, Michx., is employed in the United States as a tonic and sedative, and has recently been introduced to the notice of medical men in this country. It contains a bitter principle not yet isolated; also amygdalin, together with a substance analogous to emulsin, which, reacting on each other in the presence of water, yield hydrocyanic acid and a volatile oil resembling that of bitter almonds.†

Bark of *Ulmus fulva*, Michx., a North American tree, is remarkably mucilaginous, and of an agreeable odor. The infusion is a good demulcent, and recommended in dysentery and stranguary. The bark is also sometimes chewed as an expectorant, and in a bruised state may be used for poultices. It probably possesses no advantages over linseed, marshmallow, or other common drugs of the same class.

*Anacahuite wood*, a drug of unknown origin imported from Tampico, and extravagantly valued in Germany for a short time as a remedy for consumption. Experience has not confirmed the favorable statements first put forth regarding it, and it is now almost unsaleable. Chemical experiments have failed to detect in it any constituent that can explain the good effects alleged to have been obtained from its administration.

*Dried herbs* are well exhibited by Messrs. Butler and McCulloch of London, as well as by Mr. Holland of Market Deeping, and Mr. Ransom of Hitchin. There are also some very good samples shown by Mr. Benzon of Copenhagen and Messrs. Wilhelm and Co. of Vienna. M. J. G. Cavalli of Gothenburg exhibits some medicinal herbs excellently dried in a compressed form. The Jury are not acquainted with the process adopted for obtaining the extreme compactness and beautiful appearance for which the specimens are remarkable.

### 3. PHARMACEUTICAL PRODUCTS FROM THE ANIMAL KINGDOM.

*Cod-liver Oil*.—The Exhibition contains many samples of this important medicinal agent, contributed by Newfoundland (including the French Islands of St. Pierre and Miquelon,) Norway, and England. The pale oil manufactured in London is much esteemed, but the supply is by no means equal to the demand, and an immense quantity of foreign oil is also consumed. This pale oil is prepared by a process originally devised by Mr. Donovan of Dublin,‡ which consists in placing the perfectly fresh livers in a metallic vessel, and heating them with constant stirring to a temperature of 180° F., by which treatment they break down into a uniform, pulpy, liquid mass. This mass is immediately transferred into calico bags, whence the oil drains out; after filtration while still warm, it is sufficiently pure for use. In this state the oil con-

\* Stenhouse. "Proceedings of the Royal Society," June 23, and July 10, 1861.

† Wood and Bache, "Dispensatory," Ed. 11, (1856), p. 637.

‡ "Dublin Journal of Medical Science," vol. xvii. (1840), p. 357.

tains, at the temperature of 60° F., a considerable deposit of stearine, which it is the practice of some pharmacutists to remove by filtration, but of others to allow to remain, under the idea that the stearine, (which is perfectly fluid at the temperature of the human body) is no less efficacious than oleine. The cod-liver oil of Peter Moller of Christiania is prepared by a process essentially the same as that just described.

*Dugong Oil.*—This oil is produced from the bodies of two herbivorous cetaceous animals of the family *Manatida*, the one *Halicore Dugong*, Illig., an inhabitant of the Indian seas, the other *H. australis*, Owen, occurring off the northwest coasts of Australia. It has been lately employed as a substitute for cod-liver oil, especially in Australia. Samples from that colony, and also from Ceylon, afforded, we presume, by the two species of *Halicore* above named, have been sent to the Exhibition. That from Ceylon is a solid white fat, almost devoid of odor; those from Australia are liquid oils containing a deposit of stearine; all have a slight tallow-like taste, and but little smell.

Dugong oil, having no *fishy* smell and taste, is supposed to offer an advantage in these respects over cod-liver oil. We are not aware that any extensive trials of it have as yet been made in Europe.

*Pepsine.*—There are two English exhibitors of this substance, namely, Messrs. Morson and Son, and Mr. J. L. Bullock, and one Austrian, Dr. Lamatsch. Mr. Squire, as the agent of M. Boudalt of Paris, may also be named, though we think he does not display any specimen.

Messrs. Morson, who prepare pepsine from the stomachs of calves, exhibit it in the pure state as a gray extractiform mass: it is not, however, commonly sold in this form, being more convenient when reduced to a powder with starch, in which state it has received the name of *Poudre nutritive*. M. Boudault's pepsine, which, as we gather from his pamphlet, is prepared from the stomachs of sheep, is also mixed with starch. Mr. Bullock's pepsine is prepared from the stomach of the pig, upon the principle, we believe, that the pig's omnivorous habits render it probable that its gastric fluid would supply the best substitute for that of the human stomach. However this may be, Mr. Bullock's pepsine may well be superior in strength, as it is sold in an unmixed state. Dr. Lamatsch, as it would appear from his advertisement, employs the stomachs of both pigs and calves for the preparation of pepsine, which, like that of Mr. Bullock, is offered for use unmixed with starch.

[The remaining articles of animal *Materia Medica* call for but few observations. The common blistering flies (*Cantharis vesicatoria*, Fabr.,) are well shown among the productions of Hungary. *Myiabris Cichorii*, Fabr. (and *M. Sida*, Fabr.?), the best source of cantharidine, occurs among the drugs of India; a specimen of *Lytta vittata*, Fabr., in the collection of the Philadelphia College of Pharmacy,\* and one of *Meloe mainalis*, L., among the drugs of Spain.

*Cantharidine* is represented by a very large and fine sample from the laboratory of M. Merck; Messrs. T. and H. Smith likewise exhibit it.

Of *Ambryris* a fine mass may be noticed in the case of a Paris perfumer, M. Clave.

*Musk* is not well shown, though it would have been easy in London to display a series of specimens representing it in all its varieties. Of *Civet*, there is a solitary and bad specimen sent from India. *Castoreum* is shown by a Canadian exhibitor, as well as in the collection of the Pharmaceutical Society.]

\* In the *List of Awards*, which we have not space to print, it is stated that the collection deposited by the Philadelphia College of Pharmacy received a medal.

**OBITUARY.**—Prof. Dr. G. F. Walz was born in 1817, in Waldmikelbach, Hesse Darmstadt, where his father held the office of revenue collector. When fourteen years of age, he was apprenticed to a pharmacist in Furth, and removed afterwards to Heidelberg, where he completed his studies. Subsequently he settled as apothecary at Speyer, Rhine-Pfalz, where he soon commenced his career of usefulness. Here he became one of the founders of the polytechnical school, and was active for several years as director of the pharmaceutical and chemical branches, in connection with which he opened his well-known Pharmaceutic-Chemical Institute, wherein a number of the young German pharmacentists received their scientific education.

Walz knew the value of scientific literature, and regarded it as a duty incumbent upon every one to contribute his mite towards the progress of science. Many pharmaceutical journals of that time contain scientific researches from his pen, and his sphere of usefulness in this department became still greater after he had commenced the *Neues Jahrbuch der Pharmacie*, which afterwards was selected as the organ of the southern branch of the German Apothecaries Association, of which society Walz was the efficient President.

In 1856, he removed to Heidelberg as private instructor (*Privatdocent*) in Chemistry, Botany, and Pharmacology, and subsequently he was selected for the Chair of Chemistry at this celebrated university, which he occupied at the time of his death. His continued mental labors probably induced the disease which so soon terminated his useful career. In March of the present year, he was seized with a brain fever, from which he had apparently recovered, when on a journey he was taken with a relapse, and died suddenly at Zwingenberg, at the house of a friend. He was but in the 45th year of his age, too young for science which has lost an ardent and conscientious laborer, too young for his friends, who mourn the loss of an excellent father, an efficient teacher, and urbane companion.

In his chemical researches, the deceased studied with predilection the constituents of those substances which are or have been employed in medicine. A number of his essays have been transferred to the pages of this Journal; for instance, his analysis of *Bryonia alba*, *Convallaria majalis*, *Gratiola officinalis*, *Colocynth*, *Colchicum*, *Arnica*, &c. He is a bright example of continued devotion to Pharmacy, for the elevation of which he has worked earnestly and successfully as long as he was physically able to do so.

J. M. M.

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Died, on the 26th of May, 1862, at Morristown, N. J., Dr. LEWIS CONDIOT, in the ninetieth year of his age. Dr. Condiot is known to many apothecaries as the president of the second Pharmacopoeial Convention that met in Washington, Jan. 1830. He was a graduate of the University of Pennsylvania of 1794, with Dr. John Redman Coxe of this city, the oldest living graduate of that school.



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